The development of the Subject category in first language acquisition.

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Declaration.

I hereby declare that this thesis has been composed solely by myself and that the research reported therein was conducted by myself alone.

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Abstract.

The concept of the 'Subject' is a central one in both formal linguistics and psychology. Formal linguistics tends to speak of 'Subject' as a purely grammatical object which has identity only in relation to that over which it predicates. Psychology on the other hand tends to consider 'the Subject' as more closely to do with notions of the 'Self' and meaningful activity. The difference of these views becomes most profound in the study of first language acquisition.

This area seems to be one in which both perspectives are at a similar weakness, each displaying the drawbacks of its own mode of analysis. The rigidly fixed lexicon characteristic of formal linguistics finds the description of change problematic; psychology, which characteristically eschews 'theory' for empirical veracity, can sometimes become too impressionistic to comfortably describe a tendency for systematicity.

The critical review of literature which comprises Chapter 1 takes issue with the Chomskyan formal linguistic assertion that much linguistic ability, including a formally defined Subject, must be innate. It is argued and demonstrated here that the assertion is not a conclusion based on well-founded empirical evidence, but is a consequence of an adherence to formal principles.

Chapter 2 is rooted in an exposition of the developmental ideas of the early Soviet Psychologist Lev Vygotsky - especially in critical relationship with Jean Piaget - whose dialectical forms allow the description of a constantly changing and developing device. Beginning with a recognition that the 'Subject' of early child language does not fulfil formal linguistic criteria for Subjecthood, the chapter goes on through a close interpretation of infant behaviour to explore the changing ways in which the child relates to the physical world around it, to its social environment, and to itself. The goal of this chapter is to build an image of the child's growing sense of Self - and thus to a reconstructed psychological notion of 'Subject'.

The final chapter 3 returns to formal linguistics and demonstrates the compatibility of the above psychological approach to early cognitive development and the formal linguistic description of the more principled and systematic changes of later child language. The formal linguistic concept of 'Subject' is seen to be a development of the earlier psychological notion.

In conclusion, the thesis is intended to be a dialectical synthesis of psychological and formal linguistic methods, which is able to overcome inherent problems of both. The portrait of the development of the 'Subject' category is intended to be a portrait in little of the development of language as a whole.

Contents.

0 Introduction.

This thesis began life as a critique of the tacit assumptions of Chomskyan Formal Linguistics (CFL), as exemplified most explicitly in work like Chomsky 1988. Initially this critique was to centre on a perceived weakness in CFL in its description of change. This might be geographical or personal variation, historical change, or the psychological changes involved in first or second language acquisition. The difference between the conceptual apparatus of CFL and the apparent changes occurring during first language acquisition seemed the most profound and so I plunged myself into the criticism of 'Parameter setting' models of language acquisition, and the broad theoretical paradigm in which they worked.

Much of the fuel for my critique at this point came from experimental psychology, and especially from longitudinal studies of the behaviour of very young children. However, it soon became clear that psychology came with its own tacit assumptions and weaknesses. It seemed that the psychologists' enthusiasm for empirical experimentation unencumbered by theoretical speculation was behind two problems in particular which stood in my way. The first was terminological: because of the slightly different perspective of each interpretative study, something which seemed to be a unitary phenomenon might be described by several unrelated terms. In the second case, experimental psychology seemed to have little to say about the increasingly systematic nature of the child's developing language, and the apparent move away from semantics to syntax in linguistically aided thought.

My project became an attempt to synthesise the most useful qualities of both fields - the empirical veracity of experimental psychology with the systematising influence of formal linguistics. The ideas of early Soviet psychology were a primary guide and inspiration (e.g. Vygotsky (1934/1986). See also Phillips (1986); and Ilyenkov (1974, 1979/1982) for a broader philosophical base).

The concept of the Subject was taken as the objective focus around which this synthesis could cohere. Descriptions of the Subject seem to show both fields simultaneously at their strongest and at their weakest; and the respective areas of expertise are at their most complimentary. For CFL, the Subject is almost purely a structural entity with no necessary or sufficient semantic properties, and thus is more naturally a property of languages than of people. How does it get into people's heads? For psychology, the Subject is more often described in terms of the Self and meaningful activity. This notion is especially apparent in the behaviour of infants, but

in adult language the association with the Self seems to be lost, indeed in favour of the syntactic properties described in CFL. What happens?

Taking the failure of CFL to describe what apparently occurs in first language acquisition as its starting point (in Chapter 1), this thesis then attempts to build a systematic psychology of the changing forms of thought during the first years of a child's life. This is the focus of Chapter 2. In Chapter 3 this formal psychology turns to the reconstruction of syntactic form, thus completing the synthesis.

1
Literature review:
Nativism in the study of language acquisition.

"Formalisa. Loves deathhow simple!"

(Joyce 1939: 304.3).

1 Literature review: Nativism in the study of language acquisition.

The argument for the innateness of abstract linguistic principles and parameters, like those making up the Universal Grammar (UG) of Chomskyan formal linguistics, often appeals to the 'paucity of the Primary Linguistic Data'. In sketch, the argument is that the data provided to the language learner is not sufficiently rich to provide evidence for many of the abstract properties and structures which appear in the learner's later language; thus the learner must be equipped in advance (i.e., a priori, before birth) with the knowledge that certain properties may or may not hold of certain structures. Universal Grammar represents this innate endowment of knowledge.

First we examine the empirical claim that the linguistic input is poor and insufficient for the child to learn; second, the notion of 'learning' as defined in formal linguistics is questioned; finally, the evolution of Chomskyan linguistics is analysed to illustrate the nature of the formal linguistic notion of 'language'. In each section seminal works are put under critical scrutiny, in an attempt to appreciate the formal linguistic position at its most coherent and advanced. The conclusion is that nativism is not an empirical consideration, but is an assumption dependent almost exclusively on formal principles.

1.1 The argument from paucity of the stimulus.

1.1.1 Brown & Hanlon (1970); a critical review.

"Derivational Complexity and order of acquisition in child speech" (Brown & Hanlon (1970): henceforth referred to as BH70) is the paper most often referred to when motivating the lack of 'Negative Evidence' in the language learner's linguistic data. Negative evidence - i.e. evidence that something is *not* the case, that a certain sentence is *not* in the language being learned - consists of explicit corrections and other hints that the child's utterance is unacceptable in some way ('implicit Negative Evidence'). At least since Gold's (1967) paper on learnability, which is examined below (1.2), paucity of the stimulus has stood for the lack of sufficient Negative Evidence, the richness otherwise of the data being granted.

BH70 used data which had been collected (and is now available on the CHILDES database, MacWhinney (1991)) from a longitudinal study of three mother/child dyads in a series of hour-long natural play situations - the parameters governing the data collection are not described in detail in the paper, but are available elsewhere (Brown, 1973), the children were Adam (age 2;3;4 - 4;10;23), Eve (age 1;6 - 2;3) and Sarah (age 2;3;5 - 5;1;6). The BH70 study used five files only from each child, each file standing as representative of a 'stage' of development (as defined in Brown, 1973), this means that quite a small proportion of the data collected was actually examined: see tables 1.0(a & b) below.

Table 1.0(a): Files used in BH70.

sample	mlu	age		
		Adam	Eve	Sarah
I	1.75	2;3;4	1;6	2;3;7
II	2.25	2;5;12	1;9	2;7;18
III	2.75	2;11;13	1;10	3;0;18
IV	3.5	2;11;28	2;0	3;5;13
V	4	3;6;9	2;2	4;0;14

Table 1.0(b): Proportion of data available used.

		Adam	Eve	Sarah	Total
Files:	available	55	20	139	214
	used	5	5	5	15
	%	9.1	25	3.6	7

Much of the early part of the paper is taken up with explaining the then current ideas of 'cumulative derivational complexity', relating to the number of obligatory and optional transformations which had been applied to a postulated 'base string' to

provide the attested 'surface string'. The details of this exposition do not concern us here, save to say that they are very much in keeping with the then prevalent *Aspects* model (Chomsky, 1965) of syntactic structure, and that, taken model internally, the paper's 'predictions' - that derivational complexity and order of acquisition of certain structures are correlated - are roughly borne out by the data (results tabulated p31,2). It may also be important to be aware, however, that the *Aspects* Transformational model of syntax has long been discredited on formal grounds (the mushrooming complexity and *ad hoc* nature of the transformational grammars created by linguists) and on psychological grounds (for example parsing speeds of sentences did not directly correlat with 'cumulative derivational complexity') - see Newmeyer (1986) for a historical overview. Contemporary explanation of the order of acquisition of complex structures has moved from acquisition of certain transformations to maturation in relation to certain principles and parameters. Having expressed this caveat, the descriptive terminology is often simply translatable and the children's neologisms examined here may be re-described as instantiations of the various Functional Systems (Determiner, Complementiser and Inflection (INFL)).

The sentence types tested for, with 'Simple, Active, Affirmative Declarative' (SAAD) as a base, were; Negatives, Questions, 'Truncated predicates' (e.g. We did), Truncated negatives, Truncated questions, Negative questions and Truncated negative questions. In other words, the presence of three transformational processes was being monitored: Negation, Question formation and Truncation or elision. Negatives appeared in Brown's stage III (MLU[1] 2.75, age about 34 months for Adam and Sarah, 22 months for Eve, described as precocious), the other types not occurring till around stage V (MLU 4). The conclusion made is that structures which involve 'Transformations' like Subject-Auxiliary inversion, tag question formation and so on are acquired later than ones which don't.

In asking why the children relinquish the 'primitive' forms of speech, BH70 searches for any relation between the children's primary linguistic data (in the shape of maternal utterances) and their linguistic development. The two hypotheses entertained were that either there may be some pressure toward the more effective communication that adult forms allow, or that there may be some approval from the adult interlocutors contingent on (adult) grammatical forms.

The test for 'contingent approval' was a correlation between the grammaticality of children's utterances and the approving or disapproving nature of the parental

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1 MLU: Mean Length of Utterance. Usually measured in words or morphemes. See Brown (1973), Fletcher & Garman (1986).

response. The test for 'communication pressure' was a tabulation of 'sequiturs' and 'non-sequiturs' in response to the children's primitive and well-formed utterances. Neither test showed a significant result in favour of the presence of Negative Evidence in the child's Primary Linguistic Data. See Figures 1.1 and 1.2 below (BH70's Tables 1.11, p48;1.10, p44).

The test for 'contingent approval':

Figure 1.1: Relations between syntactic correctness of antecedent child's utterance and approving or disapproving parental response.

(a) at stage II

	Sarah		Adam		Eve	
	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect
App.	4	9	4	3	6	19
Dis.	4	6	2	0	3	5

(b) at stage V

	Sarah		Adam		Eve	
	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect
App.	23	4	13	6	33	29
Dis.	12	2	7	1	12	15

In this case the sought for correlation was between the grammatical (in)correctness of a child's utterances and any explicit (dis)approval in the maternal response. As the tables show, none of the tested examples (from stages II and V) fit the expected ranking for the presence of approval contingent on grammaticality (i.e. app/correct and dis/incorrect being the two most common pairings). On the contrary,

the authors discovered that explicit (dis)approval was much more often contingent on the truth value of the child's utterance[2]. However, BH70's analysis was subject to certain restrictions which are worth discussing.

Firstly, all single word utterances were disregarded on the grounds that they have no syntax. This is not a controversial restriction, but it is noteworthy that evidence has been gathered indicating that parental feedback not only occurs but has appreciable effect in the earlier stages of speech (Chapman et al. 1986). Chapman's study is of the effect of parental feedback on word usage in reference rather than on the child's word combinations, and thus may have little direct relevance to syntax acquisition, but it does seem to imply some basis of a negotiation of meaning between the caregiver and the child. We return to Chapman et al. (1986) in 2.5 on the Social licensing of meanings.

Secondly, only data from stages II and V were used. This is a tiny proportion of the data[3] and there are presumably data from stages I, III, IV and from after stage V for Adam and Sarah, which may have qualified the analysis we are presented with. There is nowhere any justification or explanation why precisely these and only these samples were used, apart from "In order to investigate contingencies at different levels of child proficiency, we worked with samples II and V" (p47).

Lastly, (dis)approving utterances were limited to such explicit responses as *that's right, correct, very good, yes,* or *that's wrong, that's not right, no.* All other approving or corrective utterances are excluded. Research since this study (e.g. Hirsh-Pasek et al. 1984) has verified that explicit agreement or disagreement is generally a response to the referential nature of the child's utterance, rather than its grammaticality - in other words is contingent on semantic rather than grammatical considerations. However, it has also been noted that semantic errors, almost always followed by explicit 'disapproval', can account for less than 5% of the child's speech (Bohannon 1988). By limiting its analysis to responses which explicitly refer to the child's utterance, the results of the contingent approval test seem to have a limited relevance.

The study ignores caregiver responses which less explicitly refer to the child's grammar, or types of response which perhaps correlate with certain of the child's grammatical errors. Most pointedly, BH70 excludes all caregiver repetitions from analysis in the whole of the paper, with merely a brief comment (p43) mentioning their omission. The question of the relevance of this 'implicit' correction is begged.

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2 It may be further evidence against parental guidance in language acquisition that despite this fact we grow up speaking grammatically but not always truthfully.

3 4% of Adam's files, 10% of Eve's and 2% of Sarah's; 3% of the whole data.

The test for 'communication pressure':

Figure 1.2: Sequiturs and non-sequiturs following primitive and well-formed constructions (%).

		Eve		Adam		Sarah		Means	
		SEQ	NS	SEQ	NS	SEQ	NS	SEQ	NS
Y/N	P	70	18	48	50	47	53		
	W.F.	83	13	46	43	52	47		
Wh-	P	44	37	45	50	38	62		
	W.F.	45	18	37	52	52	43		
Negs	P	70	20	00	86	33	56		
	W.F.	31	49	24	52	41	51		
Means	P	61	25	31	62	39	57	44	48
	W.F.	53	27	36	49	48	47	46	41

Entertaining a pro-communication pressure hypothesis, the expectation would have been that non-sequiturs would tend to follow primitive speech and sequiturs, well-formed (W.F.) speech (the samples for this test were taken largely from stages III, IV and V, when the children were making the transition into a more fully adult grammar). As we can see from the table above, sequiturs are the modal response to W.F. speech in only 5/9 cases and then mainly by a very small margin, and non-sequiturs are the modal response to primitive utterances in only 6/9 cases. This narrow tendency is made stronger in the means, where <W.F., sequiturs> and <primitive, non-sequiturs> are the strongest pairings.

Given that there seems to be a narrow tendency indicating communication pressure, why do the authors conclude that "the results provide no support for the notion that there is a communication pressure favoring mature constructions" (p45)?

Notably, the tendencies are narrow enough to be statistically insignificant[4] and are somewhat inconsistent (only two tests fit the ideal pairing - Sarah's yes-no and Wh- questions). The table does seem to show that there is no systematically differential response to, or even consciousness of the well-formed-ness of the children's utterances.

However, there are also restrictions on the data used for analysis in this test which warrant discussion. First, unlike for the contingent approval test, here only certain types of child utterances were examined - namely 'yes/no' and 'Wh-' questions[5] and negative statements. It seems safe to estimate that these constitute less than half of the children's utterances (they constitute 121/700 of the maternal utterances, p39), and I assume the analysis was restricted to these types for convenience (the section on contingent approval and communication pressure is after all not a main part of the paper).

Second, 'non-sequiturs' are rather messily defined - including queries and misunderstandings, but also 'irrelevancies', 'no responses' and responses 'of doubtful classification' (p43). Some of these may be examples of true 'non-sequiturs', but as the authors themselves put it "it is not clear that these should all be considered unsatisfactory responses. In some cases the child was talking fast and scarcely seemed to expect or leave time for an answer" (p45). These latter cases surely should have been taken out of consideration. What *were* taken out of consideration (as before) were caregiver 'repeats'. This is why some of the sequiturs and non-sequiturs do not add up to 100% - the repeats can amount to up to 37% of responses (e.g., to Eve's W.F. Wh- questions). It is possible that with finer grading of maternal response, which includes examination of repetitions, a different picture would surface.

1.1.2 A review of the debate.

Much of the criticism of this paper (e.g. Hirsh-Pasek et al. (1984), Chapman et al. (1986), Demetras et al. (1986), Bohannon III & Stanowicz (1988)) has concentrated on the lack of differentiation of maternal responses, and the exclusion of

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4 Working on the means-of-means table only, Chi-square = 0.46, p = 0.49.

5 'Tag' questions (e.g. "... isn't it?") were also included in the analysis, and are in the original table. However, they accounted for such a small number of data in concrete terms (only Adam and Sarah used them, and only in a handful of files), and they made so little an impact on the shape of the results, that they have been removed here to improve clarity.

implicit Commentary, rather than the limited amount of child utterances used as primary data (Demetras et al. (1986) does mention it): it is possible of course that an expansion of child utterance types analysed may not lead to a significant change in the distribution of (non)sequitur responses. In these studies repetitions and other 'Commentary' caregiver responses were added to the examination space. It then became apparent that such 'implicit' correction did show a differential function contingent on well-formedness: both in the caregiver response to child utterances, and in the children's responses to correction.

Hirsh-Pasek et al. (1984) found that, in conversation with two year olds "virtually all repetitions of the ill-formed sentences included a correction of the child's error", there was also a difference in the likelihood of repetition as response contingent on well-formedness: 20% of ill-formed utterances were repeated and only 12% of well-formed utterances (ill-formedness was defined morpho-syntactically, p84). Demetras et al. (1986), though ill-formedness was less well defined and exact figures were not given, found strong correlations between well-formed child utterances and 'Move On' or 'Exact Repetition' responses, and between ill-formed child utterances and 'Clarification Question' or 'Extended Repetition' responses. Most notably, in the data examined in Bohannon III & Stanowicz (1988), over 90% of 'Exact Repetitions' followed well-formed child utterances, and over 70% of 'Recast Repetitions' followed ill-formed utterances (well-formedness being considered separately along semantic, syntactic and phonological lines). Also, caregivers would provide correct exemplars of semantic (88%), syntactic (35%) and phonological errors (36% of the time). In sum, Commentary responses do seem to be clearly correlated with primitive utterances.

Further argument is provided by evidence of the child's differential behaviour in response to correction. In their analysis of lexical development, Chapman et al. (1986) found that, over a period of six months, two types of lexical correction (correction with joint labelling, e.g. 'that's not a car, that's a truck', and correction with explanation, e.g. 'that's a truck, see how you can put things in it') improve the extension of lexical items in production and comprehension much more than acceptance of the over-extended term. With more direct relevance, Bohannon III et al. (1988) found that children were 8 times more likely to imitate a corrective repetition than a non-corrective caregiver response (25.6% as against 3.6%). Correlations were also found between caregiver use of repetitive corrections and speed of language development (Bohannon III et al. (1988) citing Bates et al. (1982), Nelson et al. (1984)) and between 'linguistic precocity' at 2 years and the mothers' avoidance of 'Clarification Question' responses after well-formed child utterances (Demetras et al (1986)). The child does seem to respond differentially to caregiver Commentary.

Despite the apparent regularity of implicit (dis)approval contingent on well-formedness and the child's apparent ability to respond differentially, criticism is made (e.g. Morgan & Travis (1989), Gordon (1990)) that the actual proportion of utterances receiving comment is too low to provide sufficient impetus for change. For instance in the Bohannon data only 30-40% of the children's utterances receive comment (p687). Such critics point out that the linguistic data the child receives will be 'noisy' in that the child will be receiving conflicting responses to its ungrammatical utterances (i.e. they will be labelled as ungrammatical irregularly), and this conflict may confuse the learner sufficiently that learning cannot occur. However, work in Developmental Psychology seems to show that "concepts may be learned and hypotheses accurately confirmed with less than 25% of the trials using feedback"[6] and thus to imply that the language learner may be robust enough to learn from such noisy data.

Defence of BH70 tends to be along the lines of formal learnability theory and refers more often to Gold, which will be reviewed in 1.2. Morgan & Travis (1989) (henceforth MT89) is one paper which defends BH70 on more linguistic terms. It's main argument was that the caregivers (in the same database as in the original paper - with the children Adam, Eve and Sarah) did not systematically provide corrections for specific types of errors.

MT89 suffers from similar drawbacks to BH70. In particular, the very small proportion of the data actually submitted to analysis and the inadequate categorisation make an analysis which is at best inconclusive. To give these researchers their due, the Brown database is large (over 200 samples, each covering up to an hour of dialogue) and a fully comprehensive utterance-by-utterance annotation and analysis would be a substantial project in itself. However, on the drawbacks of MT89 the following points can be made:

The researchers were looking for two types of error in the children's language: over-regularisation (in the past tense, plurals and the possessive); and missing or incorrect Auxiliaries in Wh- questions. Most of the database samples (174 out of 214, about 4/5) contained use of past tense, plural or possessive NPs and (in later samples) Wh- questions. Note that the types of errors to be looked for are decided *a priori* (as the kinds of error for the correction of which explicit Negative Evidence is most required). The 6 types of maternal response were also defined beforehand (No Response, Expansion, Imitation, Clarification Question, Confirmation Question, Move On).

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6 Bohannon III et al. (1988:224) cites studies by Levine (1959, 1963) and Estes (1959).

However, error occurrence was apparently quite rare - over-regularisation (OR), for instance, was "... not highly frequent: often, only one token appeared in a sample" (p537). After samples containing OR errors had been identified , *only* those files in which a maternal response of Expansion or Clarification Question followed an OR error (i.e. errors not including missing Aux. in Wh- questions) were further analysed. Referring to MT89 Table 3 (p543, Figure 1.3 below), we see that there are in total only 50 instances of such an event. This means that at most (i.e. assuming that each file had only one instance of an OR error) less than 1/4 (50 out of 214) of the samples were fully analysed[7].

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7 Probably even fewer were analysed. For instance we know that only 10 of Eve's samples were considered as being within the appropriate language span (ages 1;10 - 2;3). Also it is clear that less than 10% of Sarah's speech was submitted to analysis (i.e. 13 out of 139 files) even though 116 files showed the relevant linguistic behaviour. So a maximum of 41 out of 214 files were analysed: less than 20% of the data.

Figure 1.3: Frequencies of responses to children's over-generalisation errors[8].

	Past	Plural	Poss.	Subtotal.	Wh-.	Total
			Adam			
Expansion	*5*	*2*	*2*	*9*	*77*	*86*
Clar. Quest.	*2*	*5*	*2*	*9*	*48*	*57*
Conf. Quest.	5	0	3	8	12	20
Imitation	2	1	0	3	5	8
Move on	13	3	25	41	844	885
No response	30	6	49	85	567	652
			Eve			
Expansion	*7*	*4*	*1*	*12*	*58*	*70*
Clar. Quest.	*4*	*2*	*1*	*7*	*20*	*27*
Conf. Quest.	0	1	0	1	10	11
Imitation	0	1	0	1	1	2
Move on	9	2	3	14	131	145
No response	5	4	8	17	27	44
			Sarah			
Expansion	*4*	*0*	*0*	*4*	*15*	*19*
Clar. Quest.	*8*	*1*	*0*	*9*	*19*	*28*
Conf. Quest.	1	0	0	1	6	7
Imitation	5	0	0	5	2	7
Move on	36	2	2	40	148	188
No response	17	4	1	22	79	101

The third stage of analysis consisted of tabulating the maternal responses which fit into the definitions of Expansion, Exact Imitation, Partial Imitation, Clarification Question and Confirmation Question, and tabulating each preceding child utterance along the definitions of Well Formed, Ungrammatical ("missing or misordered morpheme", note that this excludes OR errors, but includes Wh- errors), Lexical errors, Fragments and Unintelligible. The results are reported in MT89 Table 2 (Figure 1.4 below). We are not told the nature of the remaining maternal responses (or indeed how many there were) or to what were they responses .

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8 "Corrective responses [i.e. Commentary on the child's utterances] are shown in italics."

Figure 1.4: Antecedents of selected parental responses.

	Status of preceding child utterance					
	Well-formed	Ill-formed				
Parental response	Gram.	Ungram.	Lex.	Frag.	Unint.	Total I.f.
			Adam			
Expansion	79	174	7	6	1	188
Exact Imit.	147	21	14	4	2	41
Partial Imit.	82	43	18	6	11	78
Clar. Quest.	84	80	29	13	18	140
Conf. Quest.	188	143	24	5	6	178
			Eve			
Expansion	191	321	12	2	34	369
Exact Imit.	187	16	5	1	3	25
Partial Imit.	71	48	10	3	14	75
Clar. Quest.	118	92	7	10	32	141
Conf. Quest.	187	177	11	1	19	208
			Sarah			
Expansion	41	24	3	2	1	30
Exact Imit.	74	6	10	2	0	18
Partial Imit.	58	11	6	2	1	20
Clar. Quest.	63	28	18	5	6	57
Conf. Quest.	95	22	11	1	1	35

Even after this three-fold reduction of the search space, and contrary to the conclusions of MT89, Figure 1.4 does show significant results. MT89's interpretation of the table (p541) is limited to observations that (a) Expansions addressed to Adam and to Eve occurred most often after Ungrammatical utterances; and (b) all other response types for Adam and Eve, and all response types for Sarah, "occurred more often after grammatical utterances" (than after Ungrammatical utterances). The implication is that, apart from Expansions in the specific cases of Adam's and Eve's caregivers, none of these types of response can be considered corrective.

However, on closer inspection of these results, it seems not to be the case that caregiver response types significantly correlate with Grammatical utterances. The table below (Figure 1.4a), shows the significance of each correlation of response and preceding utterance[9]: especially significant correlations are picked out in bold; italics mark what seem to be convergences in corrective tactics across caregivers.

Figure 1.4a: Post-hoc cell contributions.

Parental response	Child	Status of preceding child utterance					
		Gram.	Ungram	Lex.	Frag.	Unint.	Total If.
Expans.	Adam	-7.58	***7.4***	-3.93	-.98	-3.2	**3.72**
	Eve	-9.22	***6.29***	-1.7	-2.3	-1.17	**4.51**
	Sarah	-2.24	***3.08***	-1.84	.11	-.37	1.3
Ex. Imit.	A	***11.3***	-5.97	.8	-.13	-1.37	-5.54
	E	***16.53***	-7.5	.27	-.56	-2.41	-8.09
	S	***3.78***	-2.83	.76	-.02	-1.36	-2.19
Part. Imit.	A	.98	-2.71	1.92	.81	**2.95**	-.48
	E	.19	-1.98	**3.03**	1.2	1.6	-.1
	S	1.79	-.85	-.51	.16	-.33	-1.04
Clar. Qn.	A	-3.95	-1.58	**2.87**	**2.7**	***4.29***	1.94
	E	-.97	-2.15	-.21	**4.67**	***4.05***	.47
	S	-4.76	.83	1.67	1.14	***2.68***	**2.76**
Conf. Qn.	A	1.71	.7	-.78	-1.93	-1.9	-.84
	E	-.33	1.27	-.12	-1.84	-1.57	.16
	S	2	-.28	-.4	-1.37	-.99	-1.16

[9] Post-hoc cell contributions from a Chi-square test. Significance is achieved at 1.96 for $p<0.05$. Positive numbers indicate the correlation occurs more than expected, negative numbers, less than expected.

It appears that Expansions correlate highly significantly with Ungrammatical utterances in all three children, as do Exact Imitations with Grammatical utterances. Again in all three children Clarification Questions correlate significantly with Unintelligible utterances. This remarkable regularity only breaks down in the responses to Fragmentary utterances and utterances containing Lexical errors: here, perhaps, the caregivers split up to their own combinations of corrective tactics - notably Sarah's caregivers' Partial Imitations and Confirmation Questions do not seem to show any very significant correctivity. However, it seems rash to base strong conclusions on such a small sample of the available data.

The 'No Response' category in MT89 (as in Figure 1.3) is problematic in a similar way to the 'unsatisfactory responses' in BH70 (see above). They are defined in MT89 as occurring if "one or more child utterances immediately followed the utterance containing the error and if nothing in the subsequent adult conversational turn was explicitly related to the error-containing utterance." Faced with multiple utterances and (possibly) multiple errors, the caregiver will presumably limit their response to the most recent utterance, whether or not it was error-containing. If we remove the 'No Response' category from consideration we find (for example in Figure 1.3; again leaving aside Sarah's results) that corrective responses are significantly above the watershed 25% for learnable regularity. This is especially the case in the OR errors; the later occurring missing Auxiliaries in Wh-questions do not show the same regularity of response.

1.1.3 Summary

BH70 and its defence in MT89 are characteristic of arguments from the paucity of the stimulus and the presence of Negative Evidence in the child's linguistic data. This brief survey of the debate has shown that the results are far from conclusive and in fact are often suggestive of the presence of a caregiver Commentary on Ill-formedness which can be responded to by the child. The weakness of the empirical argument suggests that the foundation of the position is elsewhere, and indeed BH70 and MT89, along with many other similar proponents, introduce the ideas of formal learnability theory to provide the context for the debate. It is to this context that we now turn.

1.2 The formal argument for constraints on the learner.

1.2.1 Gold (1967).

Gold's (1967) paper "Language identification in the limit" in the mathematics journal "Information and Control" may have been one of the earliest places where the argument for nativism from the 'paucity of the data' was formally and rigorously made. Gold modelled an Artificial Intelligence's (AI) learning of formal languages of increasing complexity, considering different methods of data presentation and of 'naming relation' (Gold's term for the learning algorithm. The AI was a purely formal device, not an implementation - i.e. some form of Turing machine). Learning was defined as 'identification' which was said to occur when the learner had guessed the 'name' or the grammar of its target language, after which learning ceased (p449). The output of the model, as shown below, was that language learnability was contingent on method of data presentation - that is, the class of learnable languages was contingent on the learnability model (see Figure 1.5, Gold's Table 1, p452).

Figure 1.5: Dividing lines between learnability and non-learnability of languages.

Learnability model	Class of languages
Anomalous text	recursively enumerable recursive
informant	primitive recursive context-sensitive context-free regular superfinite
text	finite cardinality languages

'Text' was defined as "a sequence of strings $x1, x2, ...$ from [the language] L such that every string of L occurs at least once in the text" (p450). It is left implicit here that *only* strings from L are present in the text (made explicit later, p453). Text presentation is shown to allow learnability of only finite cardinality languages, i.e. languages which contain a finite number of strings. To enable higher order languages to be learnable via simple text presentation, it would be necessary to constrain *a priori* the search space available to the AI. A constrained search space would compel the AI to make more elaborate hypotheses about, for instance, the internal structure of the strings of a language. These constraints can be represented formally by stipulating that certain structures are 'impossible', or that a particular structural apparatus only must be used.

Presentation by informant "can tell the learner whether any string is an element of L, and does so at each time t for some string y_t " and this method of presentation allows languages of up to primitive recursive complexity to be learnable. This class of languages was said to include languages of a formal complexity comparable to human languages.

'Anomalous Text' presentation was regarded by Gold as being "of no practical interest" as it included ordering of the text. It was assumed at the time that the data available to the language learner was a virtually random selection of strings from the target language. The paper only noted in passing that such ordering of the text can lead to greater 'learnability power'.

Gold's formal rigour is matched by his caution in extending these results to human language learning and his conclusion is a triple disjunction. Either,

(a) the class of possible human languages is restricted,

(b) the child receives Negative Evidence, or

(c) there is some other restriction on the class of texts which can occur, such as on the order of presentation of strings.

The debate (within formal linguistics) over innate linguistic faculties has occurred largely within the first two arms of this disjunction, and they have been understood in a particularly precise way. The restriction of the class of human languages may be understood in a variety of ways depending on how the 'agent' of restriction is understood. There may be some property of the external world which conditions the learner away from making certain linguistic hypotheses; some property of the learner's body (e.g. of the oral cavity) or of the medium (e.g. sound or gesture) may restrict choice; there may be some general properties of the brain which encourage

certain kinds of reasoning or learning above others. In the position reviewed here, structural restrictions on a formal device (an AI) are translated directly into discrete properties of the brain: (a) above is translated into 'there is an innate linguistic faculty in the brain, which has a specific formal symbolic structure.' This translation is reviewed in detail in 1.3 below.

'Negative evidence' is analogous to informant presentation of the data, which contains information that particular strings are not part of the target language. Although Gold recognises that explicit correction is rare, the disjunction allows for correction "in a way we do not recognise": for example, "the child may learn that a certain string is unacceptable by the fact that it never occurs in a certain context" (p453-4). This mode of informant presentation is recalled by Chomsky's later suggestion that " ... a not unreasonable acquisition system can be devised with the operative principle that if certain structures or rules fail to be exemplified in relatively simple expressions, where they would be expected to be found, then a (possibly marked) option is selected excluding them in the grammar ..." (Chomsky 1981:9). Gold's implicit nativism is made explicit in Chomsky's phrase "where they would be expected to be found" which presupposes the activity of some cognitive mechanism which is sensitive to and expectant *a priori* of "certain structures or rules". Notwithstanding these suggestions, Negative Evidence is generally understood to be explicit correction, as in BH70 and MT89 in 1.1 - so that the alternative to (a) becomes (b) the child receives explicit linguistic correction.

The third arm of the disjunction refers implicitly to Anomalous text presentation and has not been significantly followed up inside formal learnability theory. However, it is interesting that certain contemporary procedural/connectionist models of language learning are using developmental neural networks which effectively cause the input text to be ordered in a way which facilitates learning. For example, Elman's work (e.g., Elman 1992), which simulates a developing memory capacity in the learner which allows at first only short, then incrementally longer strings to be analysed by the network. This limited memory in effect constrains the search space available to the learner and complex abstract structures which would otherwise be unlearnable are generated. Gold's point is that if text is presented in a sympathetic way, learner-internal constraints on hypotheses are not necessary - Leading Text is perhaps a more evocative term than Anomalous Text. This notion of assisted development is one which is current in the psycholinguistic literature: Child Directed Speech (in a more sexist age known as 'Motherese') is more clearly pronounced, more grammatical, much less complex and much more semantically limited (i.e. to topics familiar to the learner) than adult speech (see Snow 1986). The

potential for assisted development and the whole question of a 'negotiation of meaning' will be examined in detail in later chapters.

However, alternatives (a) and (b) are really the horns of the problem, and indeed much of what might be called 'ordered text' in formal work, will in human language learning refer to constraints either within the learner (e.g. memory restrictions) or within the 'text' itself (e.g. the form of Child Directed Speech). The question is how much of the rate (speed or slowness) of language acquisition is due to external factors and how much due to biological preparation.

Gold's paper stated explicitly and developed much of what was implicit in the *Aspects* model of linguistic theory and language learning (Chomsky 1965). Chomsky's remarks on language learning at that time are limited to impressions and brief histories of rationalist and empiricist approaches to the problem of acquisition of knowledge (see Aarsleff (1982) for a critique of Chomsky's reading of this history). Although not argued for rigorously, ideas on an innate language acquisition system, separate to the rest of human cognition and on the poverty and corruption of the data available to the learner are aired suggestively throughout the first chapter[10].

As well as serving as a clear statement of the problem, Gold's paper seems to delineate the useful bounds of learnability theory and to make explicit some of the theory's grounding assumptions - for example, its definitions of 'language' and 'learning'. In contrast to more recent work on formal learnability (e.g. Osherson, Stob and Weinstein 1986, henceforth O86), Gold does not assert that his apparatus is non-trivially analogous to a psychological model. O86 defines learning in roughly the same terms as does Gold 1967, after which they write:

"Language acquisition by children is an example of learning in the intended sense. Children are the learners; a natural language is the thing to be learned; the corpus of sentences available to the child is the relevant environment [= data presentation, by text or informant]; grammars serve as hypotheses [= naming relation]. Language acquisition is complete when the child's shifting hypotheses about

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10 There are repeated references to an innate human "language-acquisition device", "language-acquisition system" or "*faculte de langage*", which seems to be functionally discrete in the "mind/brain" (although Chomsky is cautious on this discreteness, adding a slight and frankly token disclaimer in n32 p56). On the data available to the learner, Chomsky writes, " ... primary linguistic data ... consists of a finite amount of information about sentences, which, furthermore, must be rather limited in scope, considering the time limitations that are in effect, and fairly degenerate in quality" (p31). "It seems clear that ... the primary linguistic data ... may ... be deficient in various respects" (p200 n14). Chomsky also downplays the deviation between an "idealized 'instantaneous' model" (p36) of language acquisition and "an actual theory of language learning" (n19 p32).

the ambient language stabilise to an accurate grammar [= identification in the limit]" (p7). Each of these analogies embodies serious assumptions about the nature of language and learning ([1], [2] and [3] below).

1.2.2 Some assumptions of formal Learnability theory.

[1] (a) language = a thing to be learnt,

[2] (b) the child's environment = a corpus of sentences,

[3] (c) (i) the learning process = a series of grammatical hypotheses,
(ii) success of learning = identification in the limit.

O86 is at pains to expand some of the notions involved and doesn't merely assert the psychological isomorphism. In examining the analogies 1 - 3 above, it may be worthwhile to see if the expansions made to the learnability model in O86 are qualitative.

1.2.2.1 Languages

The initial, formal definition of a language is the same in Gold 1967 (p448) as in O86 (p12), i.e. that " ... a sentence is taken to be a finite string of symbols drawn from some fixed finite alphabet. A language is then construed as a subset of the set of all possible sentences" (O86 p12). We have three sets in operation (see Figure 1.6).

Figure 1.6: sets in O86.

A; the "fixed finite alphabet",

S (or $\sum A$); the "set of all possible sentences" (set of all possible finite ordered subsets of A),

L ($\sum S$ or $\sum\sum A$); the set of all possible languages (set of all possible subsets of S).

with *S* as *a* sentence (finite, ordered subset of A, or element of S) and
L as *a* language (subset of S, or element of L).

It is explicit here that all possible (past, present and future) human languages are drawn from some "fixed, finite alphabet". The content of the set A is not made explicit, but the symbols which are its members are apparently words, either of actual languages or possibly of some abstract language like Fodor's Mentalese (see Fodor 1975). In O86, this set is the set of the "biologically possible" symbols (p34) - and remember the psychological isomorphism is explicit. This strong biological determinism is never asserted (outside of parentheses) and the reader gets the impression that either (a) the question of biological determinism in linguistics has been settled beyond reasonable doubt, or (b) it just isn't important. Of course neither is true. The relevance of molecular biology to language and other higher order behaviour patterns is highly controversial[11].

Nativism, and later a stronger biological determinism, seems often to be both prior and posterior to the body of Chomskyan Formal linguistics. In his earlier work Chomsky draws on, or constructs, a 'rationalist' foundation for his work; later (e.g. Chomsky 1986, Piatelli-Palmarini 1980) he, along with Fodor, asserts that a biologically determined Universal Grammar is a consequence of the findings of Chomskyan Formal Linguistics. The development of Chomsky's position is analysed in 1.3. For now it will suffice to note that the existence of such a set as A above is a formal stipulation, a premise, rather than an empirical observation.

1.2.2.2 Environments.

As we have seen, Gold 1967 leaves open the question of how information is presented to the learner, i.e. the presence of 'Negative Evidence.' This is not the case in O86. Not only is the environment explicitly a *text* (p13), but there are also no ordering restrictions on the presentation of strings (p14). Three "recent" studies of language acquisition are cited in motivation of this - Brown & Hanlon (1970), Lenneberg (1967) and Newport, Gleitman & Gleitman (1977) - the first of which is dealt with above (1.1)[12].

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11 See for example Dawkins (1989), Rose et al. (1984) among others for an introduction to the debate.

12 OSW tell us that "Learning theory can be perceived as an attempt to provide the inferential link between the results of acquisitional studies and theories of comparative grammar. It undertakes to translate empirical findings about language acquisition into information about the kinds of languages accessible to young children" (p35). That this is mere pretension can be ascertained by looking at their bibliography, in which less than a tenth (6/61) of the entries are concerned with "empirical findings", and apart from a brief reference to the "recent studies" there is virtually no recourse to empirical findings in the text. The remainder of the references, apart from a dozen or so works on formal

The notion of Sentence in O86 is "rich" in that "derivational histories, meanings and even bits of context are parts of sentences" (p12, note the implication that "bits of context" are drawn from a "fixed finite alphabet"), also "evidential states" (basically, the text so far, p14) can include "such non-linguistic inputs as the physical affection afforded the child that day or the amount of incident sunlight" (all of which is drawn from the finite alphabet A: p35). The authors may have not noticed the possibility that this extra-linguistic input may comment in some way upon the linguistic input, but nevertheless within learnability theory none of the context, non-linguistic input or sunlight can mark un-grammatical strings as such. Despite the "rich" definition , then, O86's text is not a qualitative development of Gold's.

O86 does note the non-reactivity of the text (reactivity being an ability in the text to react to learner behaviour) and this is held in contrast to the obvious reactivity of child/caregiver dialogue (p118). It is admitted that this is "a significant theoretical gap in the development of learning theory".

1.2.2.3 Learning.

Learnability theorists have asserted that learning consists of a number of hypotheses on the structure or form of the texts with which the learner is provided (and language learning seems to be only a special case - see O86 p20 and Chomsky 1980 cited there). That this number of hypotheses is not a series can be determined by the fact that Negative Evidence is not available to the learner and so the text must be non-reactive: each hypothesis is independent of the last and dependent only on the "evidential state" of the text. Hence O86 can describe the "learning function" - here, as in Gold 1967, a learner is "a system that embodies a learning function" (O86 p15) - as a mapping between "evidential states" and "conjectures" (i.e. grammars). Thus, learning is conceived as a static relation between sets rather than as a process of development or investigation. The content of these two sets (SEQ: the set of all possible evidential states; and *F*: the set of all possible conjectures; p15) is necessarily drawn from A[13]. If we are to take O86's psychological isomorphism seriously, A

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linguistics or philosophy of language (Chomsky, Popper, Wittgenstein, Fodor, Pinker, Putnam), is entirely works of computer science (40/61 entries).

13 An "evidential state" is the set of strings received by the learner by some time *t* and as such is a subset of S. The set of all possible evidential states will be the set of all possible subsets of S.

A "conjecture" is a language (learning equals identification). The set of all possible conjectures equals the set of all possible languages, L. In fact, it seems that both of these sets are equal to L - a fact which may have consequences if the learning function is redefined as a mapping from L onto itself. This possibility is tangential to my argument however.

must be available to the child *a priori*. This "biologically possible" alphabet (which includes "bits of context", "incident sunlight", etc.) is in effect biologically specified.

Fodor also hints at such an alphabet (1975, 1980) as a vocabulary in which conjectures can be formed. Fodor does not attack procedure as such and he describes learning as a series of inductive inferences - expressed in the innate Language of Thought, and guided by innate structural constraints - rather than as a mapping between sets. The Language of Thought is analogous to O86's set A; and in O86's rich notion of sentence, structural components ("derivational histories") are also innately specified by set A.

Both of these theses seem to draw most heavily on formal logic and set theory for their conclusions, and in them it seems that the sometimes distant relationship between concrete source and abstracted form is either not fully appreciated or conveniently forgotten. Certainly in Piatelli-Palmarini (1980; henceforth PP80) Chomsky and Fodor argue for nativism in defence of their formal assumptions. This is most explicit in Chapter 12 (The inductivist fallacy; p 255-275) where Chomsky defends inferences based on purely formal assumptions, claiming that the investigator's "compulsion to withdraw" is merely "psychological" (p270). Evidence against formal assumptions is apparently not recognised. More importantly, Fodor makes an explicit comparison between nativism and the search for simplicity in a formal description: on the mathematician's use of the simplest possible equation to represent a set of Cartesian co-ordinates he says, "You can call that simplicity, or an a priori ordering of the functions, or nativism. This leads to the same point as before: *you can't carry out an induction, it is a logical impossibility to make a nondemonstrative inference without having an a priori ordering of hypotheses*. This general point about nativism is so self-evident that it is superfluous to discuss it; the only question is; how specific are the innate constraints?" (p260; emphasis in original).

This confusion of scientific practice and biological behaviour conceals the crucial difference between the investigating scientist (e.g. the linguist) and the developing biological unit (e.g. the child learning language). It is a difference which is allowed to remain hidden by Piaget's conception of the child as a little scientist. The linguist's representation and the child's internalisation of linguistic structure are both acts of abstraction, abstracting components which are considered important from the immediate data. For Fodor, formalisation is a transparent process involving no interpretation on the part of the linguist: "... imagine that the conceptual system of an

organism ... is formalised as a logic. In other words, imagine that we know what its conceptual system looks like: we know what the elements are, we know about its semantics, and we know what combinatorial mechanisms are available" (p156). The notion that the components which are considered important by the linguist are the same as those considered important by the language learner is almost explicit.

However, as Fodor puts it, what one considers important depends on *an a priori ordering of hypotheses*. In Chomskyan Formal Linguistics, hypotheses are ordered by the criterion of formal simplicity, which is in turn dependent on decisions made concerning the object of study and how it is to be formally represented. What the child learning language considers important is surely part of the problem of language acquisition. In 1.3 we sketch the Chomskyan conception of the object of study; in sections 2 and 3 we consider the language learner.

1.3 The development of Chomskyan Formal Linguistics.

It has on occasion been claimed that Chomskyan linguistics is not 'generative' (in Chomsky's sense; see below) or not 'formal linguistics' (e.g. Gazdar et al. (1985), Pullum (1991:47-55)). This charge has generally been made on the grounds that details of formalisation have been increasingly taken for granted or left implicit in Chomskyan descriptive structures. In this thesis there is a distinction made between a formal structure and a formalised structure. A formal structure is one which is concerned primarily with abstract or ideal forms and their inter-relations, rather than with the content of these forms; a formalised structure is one in which a primary concern is to taxonomise forms and explicitly detail their interrelations. Chomskyan linguistics may often not be formalised (a defence may be that such study is not concerned with the 'implementation' of some of its points of theory; or see Chomsky's (1990) reply to Pullum), but it is surely formal in the sense that it has its primary concern with the forms which a linguistic system can take - not with the content of utterances, but with the structure of sentences. Investigation and argumentation is typically in the form of an exploration of the formal capabilities of a logical system.

1.3.1 The paradigm.

1.3.1.1 Aspects of the theory of syntax.

Chomsky (1965) takes up a Cartesian idealisation of language in the duality of Competence and Performance. As with Saussure (1916), he emphasises the structural, law driven nature of Competence/*Langue*, which renders it appropriate for scientific study, and the random, ephemeral and secondary nature of Performance/*Parole*. The analogy between Chomsky's and Saussure's taxonomies is explicit (p4) but not whole. There are perhaps two main differences.

The first difference with Saussure is a withdrawal from the social. Although it often seems a token gesture, Saussure does define *Langue* as a social convention. In emphasising the arbitrary nature of the sign, he posits *Langue* as a conventional system of rules; in opposition to this, and in illustration of the system's vulnerability to change, *Parole* is presented as a collection of accidents of speech and interaction,

rooted solely in the individual. Competence, on the other hand, is the linguistic knowledge of "an ideal speaker-listener, in a completely homogeneous speech-community, who knows its language perfectly and is unaffected by ... grammatically irrelevant conditions ..." (p3); Performance is "the actual use of language in concrete situations" in terms of "such grammatically irrelevant conditions as memory limitations, distractions, shifts of attention and interest, and errors (random or characteristic) in applying [the speaker-listener's] knowledge of the language" also " false starts, deviations from rules, changes of course in mid-course, and so on" (pp 3&4).

Attention is much more focused on the individual and this links in with much of Chomsky's psychological rhetoric. However, the dualism of Chomsky's system is less not more psychologically based than that of Saussure's. Saussure's speaker-listeners are real individuals subject to their language as to a binding contract. Chomsky's speaker-listener is alone in space-time - the speech-community is peopled by copies of himself[14] - in fact he is so abstracted from the concrete that he becomes no more than a vehicle which Competence can inhabit. Competence in other words is "the grammar" of the language in question[15]. The individual has been divorced from society even in Performance: an inventory of limitations of an error-prone piece of equipment.

In a second departure, Chomsky takes issue with *Langue* as a "systematic inventory of items" and, with Competence, "return[s] ... to the Humboldtian conception" of "a system of generative processes" (p4). However, a structured system is merely a way of making explicit what is already implicit in a systematic inventory: indeed, the advantages of structures over lists is Saussure's advance, not Chomsky's (see Saussure's (1879) analysis of Proto-Indo-European laryngeals, discussed in Anderson (1985)). Other than a psychological veracity which Chomsky seems to be hinting at, this difference is vacuous, or at best merely formal.

But if the reader refuses to take appeals to psychological veracity at face value, it becomes clear that the Chomskyan model of language is devoid of any creative mental activity in a Cartesian or Humboldtian sense. There even seems to be little evidence of any linguistic "Behavior" in the speaker-listener - in the sense of American Behavioural Structuralists like BF Skinner (e.g. Skinner 1957).

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14 In Chomsky (1965) the ideal speaker-listener is male.

15 Chomsky's use of the definite article is very much a conscious and significant one.

For example, when Chomsky characterises Competence as a "system of generative processes" it is later made clear that "generative" is meant only in the deductive logical sense of postulates entailing other postulates (p9); similarly with his use of the word 'creative'. Chomsky is actually describing an explicit logic, the production rules of which are 'creative' in that they can '(in Humboldt's words) "make infinite use of finite means" - a phrase which Chomsky uses to refer to "the technical devices for expressing a system of recursive processes" (p8). For Chomsky, "creative" seems to mean "containing recursive production rules".

Competence is a "mental reality underlying actual behavior" (p4), but, as I have argued, this 'mental reality' is a formal logic. Thus, the "mentalism" with which Chomsky wishes to replace behaviourism (p193 and Chomsky 1959) amounts to little more than methodological adjustment - that more elements of performance can be allowed as evidence (although Chomsky seems to think introspection is not part of Performance); and that formal description can take place at a more abstract level, without the necessity for less abstract levels to be completed in priority.

In practice language as an object of study has become a functionally separate part of the human mind, in the sense that the linguist can study linguistic Competence without reference to other components of behaviour. In his Chapter 1.8 it is clear that this autonomy extends to language acquisition, although Chomsky has a defensive caveat at this point (p56 n32). This claim to autonomy is strengthened by frequent reference to the presence of an innate "linguistic theory" (p25), "schema" (p27), "language acquisition device", "faculte de langage", etc.

1.3.1.2 Lectures on Government and Binding.

In Lectures on Government and Binding (1981, henceforth LGB), a founding text for what was to become Government-Binding (GB) theory in all its forms, Chomsky withdraws further from language as a social reality. The descriptive apparata constructed in LGB are describing grammar, not language. In particular "Core Grammar", which is contrasted with a "Periphery" of "marked" constructions such as "borrowings, historical residues, inventions and so on, which we can hardly expect to ... incorporate within a principled theory of UG" (p8).

Having been divested of its diachronic half in the *Cours*, and its social nature in *Aspects*, the object of study is further limited to those features of grammar deemed sufficiently pure. Thus Core Grammar is further abstracted from "language" or

linguistic Performance. For example, not only do sentences containing too much "borrowing, residue, or invention" not have to be covered, but sentences which are "not idiomatic English [due to] accidental gap[s] reflecting properties that are not part of Core Grammar [are] thus assume[d] to be fully grammatical at the relevant level of abstraction" (p19). In principle, therefore, there needs to be little direct correlation between Core Grammar and any human language.

Thus Chomskyan linguistics becomes the study of grammar and not language. A motivating assertion is made (p4) that language is derivative of grammar, and "at a higher level of abstraction from actual neural mechanisms", implying that grammar is neurally represented in a more concrete manner than actual linguistic behaviour. There are no studies in neural or brain sciences cited to back up this statement. Language is certainly derivative of "actual neural mechanisms", but the grammar which is constructed by linguists is equally certainly derivative of observed linguistic data. There is another reference to neural structures (p339) which suggests that "the theory of core grammar ... does have some of the properties of the systems studied in the more fundamental natural sciences, and that for some reason neural structures at least in this domain instantiate a perhaps surprisingly simple and unified system of principles."

It is telling that LGB draws comparisons with particle physics as there too the data available to the scientist greatly underdetermine some of the postulated structures. It seems that a large motivation behind much development of the theory is toward formal simplicity and 'elegance'. Much of what LGB says about the theory of Core Grammar can be said of the more fundamental natural sciences - for example that Core Grammar is "a system that goes well beyond empirical generalisation and that satisfies intellectual or even esthetic standards" (p14).

With formal coherence and concision as such a strong motivation, other factors become less important, and indeed LGB is surprisingly relaxed on the question of language acquisition. Apart from occasional assertions of biological determination[16] it seems to be left open whether UG is innate at all, all that is important is that it is in place before language learning begins. Although "the idealisation to instantaneous acquisition" is still assumed, there is a stipulation that the primitives of UG be "concepts that can plausibly be assumed to provide a preliminary, pre-linguistic analysis of a reasonable selection of presented data" (p10) such as "precedes", "is

16 Only two were found: that UG is "an element of shared biological endowment" (p8) and that the faculty of language is "surely" a biological system (p14).

voiced" and perhaps "agent-of-action", which are concepts plausibly developed in early play - and this is the direction I shall be exploring in Chs 2 & 3.

This could be interpreted as a relaxation of the biological determinism of Chomskyan linguistics, but there is evidence that it is more significant of a decrease in importance of language acquisition in general. There are several references to the 'limited, underdetermining evidence' available to the language learner being a major motivation of UG's innateness, but in LGB's outline of the three types of evidence actually available it appears that "[t]here is good reason to suppose that direct Negative Evidence ["corrections by speech community"] is not necessary for language acquisition"[17] (p8/9; emphasis added). Direct Negative Evidence is not necessary because of the presence of innate constraints, which had been postulated because direct Negative Evidence was assumed not to be available.

So the biological determinism of *Aspects* is now accompanied by a deterministic idealism (that the formal constructs have 'more significant reality' than actual linguistic behaviour). It appears from other texts (e.g. Piatelli-Palmarini 1980) that a biological determinism is the only plausible realisation available in an age of materialism, for the rationalist ideals of LGB's theory.

1.3.1.3 Knowledge of Language.

Knowledge.

By Knowledge of Language (Chomsky 1986, henceforth KoL), the "poverty of the stimulus" argument, characterised here as "Plato's problem", has become the major if not the explicit sole motivation for a biologically determined UG. In pointing out (p25n13) that "the questions of innateness and species-specificity are distinct", KoL implies that the species-specificity of language does not entail its innateness and that therefore linguistic invariance cannot be used to motivate biological endowment. That generality is neither a necessary nor a sufficient condition for innateness had already been pointed out to Chomsky (e.g. Cellerier 1980: 86). However, for most purposes in the text the terms do seem to be used interchangeably.

"Plato's Problem" goes through two incarnations in the preface (p*xxv*):-

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17 Wexler & Culicover (1980), Baker (1979) and Lasnik (1979) are cited here.

[1] "how can we know so much given that we have such limited evidence?" and

[2] "The problem, then, is to determine the innate endowment that serves to bridge the gap between experience and knowledge attained."

The second may be the question as put forward by the 'rationalists' in *Aspects*; it is translated into its linguistic application:-

[3] "... to ascertain the nature of the biological endowment that constitutes the human 'language faculty,' the innate component of the mind/brain that yields knowledge of language when presented with linguistic experience ..." (p*xxvi*).

Figure 1.7: Translations.

p*xxv* [2].		p*xxvi* [3].
the innate endowment	=	the biological endowment that constitutes the human 'language faculty', the innate component of the mind/brain
experience	=	linguistic experience
knowledge	=	knowledge of language

But [3] is not a trivial translation of [2] (see Figure 1.7): that such things as "the human 'language faculty'", "knowledge of language" or "linguistic experience" exist as functionally separate entities is a presupposition which is not defended or even explicitly asserted in KoL. It is perhaps a falsifiable claim, however, and KoL is willing to subject its conclusions to the scrutiny of the brain sciences: in choosing between competing linguistic theories "one might contain certain principles and possibilities of variation that can be readily explained in terms of brain mechanisms, and the other not" (p39). On the other hand, the fact that brain science does not point to the biological analogues of Chomskyan linguistic principles is perhaps evidence that brain science is not sufficiently 'advanced' to enable it to do so. Slightly later there is a comment that

"the conclusion [that "the language faculty appears to be a computational system that is rich and narrowly constrained in structure and rigid in its essential operations, nothing at all like a complex of dispositions or a system of habits and analogies"] is in many ways a rather surprising one. One might not have expected that a complex biological system like the language faculty would have evolved in this fashion ..." (p43/4).

This is very much an echo and a reassertion of LGB's deterministic idealism (see 1.3.1.3) and as in LGB there are virtually no references to brain science in the bibliography, and certainly no studies of the physiology of cognition.

Language

Possibly because this book is aimed at the educated layperson as well as the scholar it is more explicit in its definition of 'Language'. 'Language' is now re-defined in terms of 'E-language', 'I-language'.

KoL points out that much previous work had left somewhat ambiguous what exactly was the object of study, or what was it that a grammar was attempting to describe. The programmatic works examined above often made this same point and this same call for explication, but in practice the extension of the term 'grammar' was often either ambiguous or vague between description of the structural properties of an attested language and a hypothesis about the speaker-listener's actual cognitive equipment. In KoL this programmatic call for explication shifts from conflict between different types of event (e.g. a real speaker's performance & an ideal speaker's competence) to that between different types of language.

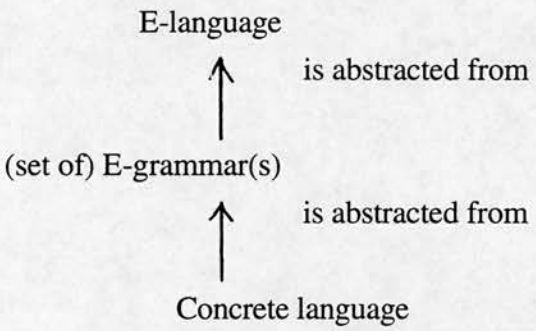
- **E-Language.**

"Externalised language" is described as being an analogue of the object of study of earlier "structural and descriptive linguistics" (p19) and compared with Saussure's *Langue* and Bloomfield's "totality of utterances that can be made in a speech community" - the "actual and potential speech events" (p20). This is not equivalent to *Parole* or Performance, however, as the speech community is idealised and regarded as homogeneous. E-language stands ambiguously as an ideal object

somewhere between the actual language of a homogeneous community, and a grammar which might describe this language.

Thus there are two entities implicit in the text: an E-language (the linguistic behaviour of an ideal homogeneous community) and an E-grammar (a grammar defining the E-language; this second is never explicitly mentioned and is an interpretation on the part of the present author). An E-grammar might be the kind of traditional descriptive grammar used for teaching or philological study (e.g. Quirk et al. (1985), Wade (1992)), and an E-language the language described. There are potentially infinitely many E-grammars for each E-language and none of these has claim to be *the* E-grammar, as all are extensionally identical - extension being the only qualifying criterion.

Figure 1.8: Chain of abstraction towards E-language.



There is a chain of abstraction here, illustrated in Fig. 1.8, between E-language, E-grammar, and (an) actual language. An E-grammar, like that in Quirk et al. (1985), is abstracted from the concrete collection of behaviours that comprise Performance of an actual linguistic community (which in the case of English can be almost globally extensive, see Gramley & Patzold (1992)). However, the relation is not reciprocal, and the E-grammar does not generate (in the Chomskyan sense) the full range of behaviours apparent in the actual language. The language 'generated by' (or abstracted from) the E-grammar is a further step removed from attested data. "Languages in this sense [i.e. E-languages] are not real-world objects but are artificial, somewhat arbitrary, and perhaps not very interesting constructs" (p26). For Chomsky, there must be more evaluative criteria on E-grammar than mere co-extension with (a significant portion of) the attested data.

- **I-Language.**

"Internalised language" is the "'notion of structure' in the mind of the speaker" (p21, citing Otto Jesperson), in other words, a development of the concepts Competence, Core grammar and Periphery. Theories of I-language (which we'll call I-grammars) can be subjected to "questions of truth and falsity": a 'true' I-grammar is one which actually inheres in the mind-brain of the speaker-listener, such that "one task of the brain sciences, then, is to discover the mechanisms that are the physical realisation of [the I-language]" (p22). Whereas E-language has a problematic reality, I-language is simply a formal description of the biologically extant 'human language faculty' and is thus a more promising object of study.

The speaker referred to is not the ideal speaker-listener of *Aspects*, and "in principle, evidence concerning the nature of the I-language and initial state could come from many different sources apart from judgements concerning the form and meaning of expressions: perceptual expressions, the study of acquisition and deficit, or of partially invented languages such as Creoles, or of literary usage or of language change, neurology, biochemistry and so on" (p36/7). In practice, however, and this includes the practice in KoL itself and the overwhelming practice of GB/KoL-based linguistics in the seven years since its publication, introspective judgements concerning the form and meaning of expressions are virtually the only source of evidence[18]

I-language is thus promoted as being closer to physical reality than other postulated forms of language (e.g. E-language). Not only are statements about I-language testable (in principle), but the notions themselves are more meaningful. I-grammar is presented as the actual formal structures and processes in the mind of the speaker-listener; I-language is some analogue of the innate language of thought without corruption from procedural errors or cultural interference. In practice, however, the Chomskyan linguist works from the same set of data as does the earlier philologist, and I-grammar appears to be merely a particular E-grammar which is abstracted from the concrete collection of E-grammars (see Fig. 1.9). As evidence from the brain sciences is un-available at the moment, the only criteria for this abstraction seem to be those contingent on the mode of representation - e.g. of formal simplicity.

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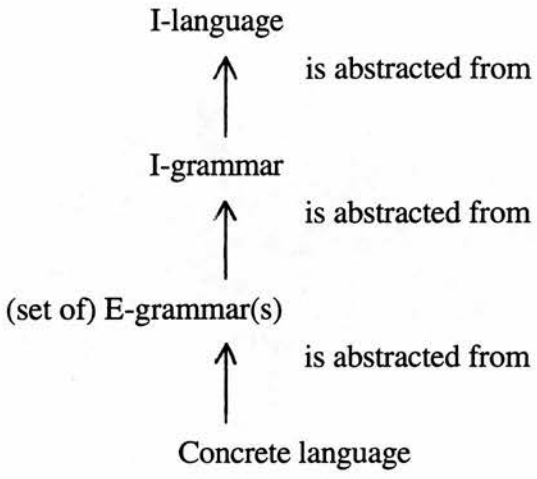
18 Examples of formally oriented research that has been done on language acquisition (e.g. Valian 1990, 1991) will be examined in the relevant chapters.

Figure 1.8: Chain of abstraction towards I-language.



1.3.2 Primary Linguistic Data

Figure 1.9: Primary linguistic data.

[1a] The man is tall.
[1b] Is the man tall?
[2a] The man [who is here] is tall.
[2b] Is the man [who here] is tall?
[2c] Is the man [who is here] tall?

[3a] I wonder who$_i$ [the men expected [e$_i$] to see them].
[3b] [The men$_i$ expected [e$_i$] to see them].
[3c] John$_i$ is too stubborn [e$_i$] to talk to Bill.
[3d] John$_j$ is too stubborn [e$_i$] to talk to [e$_j$].

[4a] Gordon gave a present to Halcyon.
[4b] Gordon gave Halcyon a present.
[5a] Gordon sent a present to Halcyon.
[5b] Gordon sent Halcyon a present.
[6a] Gordon said something horrible to Halcyon.
[6b] * Gordon said Halcyon something horrible.
[7a] Gordon donated his letters to the library.
[7b] * Gordon donated the library his letters.

Sentences like the above are offered (Chomsky (1980: 39), KoL p8, Atkinson (1986: 98); labelling added) as illustrative of the structure-dependence of linguistic rules - for example, the relations between discontinuous constituents are determined in terms of abstract structural entities like 'head-of-phrase'. Children "unerringly" use such complex structurally dependent rules rather than computationally simpler ones which may have similar extension, despite being without "instruction or direct evidence" (KoL p7).

For example, on the evidence of sentences [1] above, a rule of 'question formation' might be expected which fronts the leftmost modal verb (a paraphrase of PP80 p39). This would result however in utterances such as the ungrammatical [2b]

which are not attested. Thus, the argument runs, there must be *a priori* constraints which force the learner to phrase rules in structural terms - for instance that the fronted modal should immediately follow the first noun phrase of the declarative (again, following PP80 p39), resulting in utterances like the attested [2c].

The same argument - that the learner is not constrained by confirmatory or Negative Evidence in the primary linguistic data - is put forward to require an *a priori* structural vocabulary which can describe the discontinuous relations evident in the sentences [3].

However, these examples [1 to 3] seem only to be relevant to later stages of language acquisition, namely stages after the acquisition of the functional categories (Determiner, Complementiser and INFL phrases) which occurs during a period of up to 6 months, commencing after word order and the lexical categories have been acquired - taken to be on average at around 24 to 30 months (Radford 1990)[19]. It is possible that the learner's hypotheses at these later stages are constrained by structures acquired earlier[20].

Atkinson's examples [4 to 7] are more interesting. The argument here is that

[i] the ditransitive sentences in [4] and [5] are part of the learner's Primary Linguistic Data, used and understood by the child and

[ib: assumption] (given that Negative Evidence of the sort in sentences [6b] and [7b] is absent)

[ii] the relation can be generalised by "a transformation (dative movement)" (p99) such as in Figure 1.10 below.

Figure 1.10: Dative movement.

NP	V	NP	to	NP						
1	2	3	4	5	=>	1	2	5 + 3	0	0

19 See also Slobin (1966) on the acquisition of word order before Case in Russian and O'Grady et al. (1989) on the period over which aspects of INFL are acquired. Acquisition of word ordering and separate lexical categories may seem to imply an acquisition of Phrase Structure, but this is not a strong implication.

20 Chomsky's 1980 example (sentences [1 and 2]) is particularly clumsy as it seems to be forgetful of the bidirectional nature of a 'question formation' relation, in other words one would expect acquisition of such a rule to be accompanied by a 'declarative formation' rule at around the same time (if not earlier as much of the learner's task incorporates understanding questions). Putnam (1980) points this out. As any such rule would be structural, one would not necessarily expect the simpler 'question formation' rule to be chosen - one would presumably rather expect (on the criterion of 'simplicity') a single reversible rule. This is a minor point, however.

[iii] "Demonstrably the child does not make this generalisation", and therefore

[iv: conclusion] constraint is needed to legislate against it. "This constraint is then built into the language learner as part of the solution of the logical problem of language acquisition."

Each of these four steps can be contested. The conclusion depends on the enthymemic assumption at [ib], which I have contested elsewhere, and Atkinson himself has attested child utterances of the form of [6b][21] thus negating [iii], but nonetheless the argument is of interest.

Transformational syntax is perhaps adequate to describe the syntactic relation between the prepositional and dative formations of ditransitive verb phrases, but it also draws attention to the implicit directionality in Atkinson's argument (similar to that of Chomsky 1980, pointed out in n.8). Perhaps the most implicit assumption of this text is that the [b] forms are derived from the prior [a] forms - the relation is an arrow of implication, not a bi-directional 'equals' sign.

The linguistic performance of children does not imply this priority, however. If we look at the developing language of Allison Bloom (16 months - 34 months; Bloom 1973, Bates & MacWhinney 1991, Uemlianin 1992), for example, the opposite priority is implied. There is only one attested utterance which could be interpreted as ditransitive (the more cautious Bloom says there is "no instance of dative" (p24)), reproduced with context below (Allison is 22 months old at this point):-

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21 Atkinson (p106) explains that we should not expect utterances like "I said mummy night-night" , and then admits, "but I have attested [this utterance] and I would be extremely surprised to be unique in this respect."

Figure 1.11: Allison Bloom's ditransitive verb.

```
                    *MOT:     here, I-'ll pour some juice
                              for you.
                    *MOT:     there.
                    %act:     <1w> pours juice, gives it
                              to Allison
*ALI:     pour Mommy juice.
%act:     starting to drink juice
                    *MOT:     pour Mommy juice?
                    %act:     <aft> pours self juice
<aft>                               drinks
*ALI:     xxx.
%act:     <bef> drinks then puts cup down beside her;
looks in front of her
          <1w> reaching for cookie box
*ALI:     more juice.
```

There are two alternatives to the interpretation of Allison's "pour Mommy juice":-

(i) That it is a description of what has just occurred, with 'Mommy' as the Agent of the utterance (i.e. 'Mommy poured the juice'). If this is so, it is the only example of an Agent intervening between Verb and Object (there are non-adult word orderings, but the active noun phrase is always external) and hence unlikely.

(ii) That "Mommy juice" is a single noun phrase with "Mommy" as genitive determiner ('Mommy's juice'). This is possible, but although Allison does use compound noun-phrases of this sort, intra-NP relations are not yet differentiated between what might be called possessive, locative, accusative and dative and this seems to be characteristic of English before fluent use of prepositions (see 2.5.2 & 3.1 on Locatives).

Due to this indeterminacy, it is difficult to ascribe the same structure to Allison's utterances as to the sentences [4] to [7] above. The important thing for the present is that utterances with the form of dative ditransitives (like Fig. 1.11) are in operation significantly before prepositional ditransitives (use of grammatical prepositions is only beginning toward the end of the Bloom 1973 data). If evidence

from the learner's own performance were relevant to linguistic competence we might expect the above generalisation to be reversed:-

Figure 1.12: 'Prepositional transformation'.

NP	V	NP	NP					
1	2	3	4	=>	1	2	4	to/for + 3

Thus [b] => [a]; among the entailments of this logical statement there is not { *[b] => *[a] } and the learner is not led to accept sentences like [6b] and [7b]. Extraneous constraints are not required.

1.4 Summary: Principles and Parameters.

Criticism of BH70 in 1.1 seems to erode the case against Negative Evidence in the learner's linguistic input. Examples of linguistic performance like that of Allison Bloom's ditransitive construction above raise the possibility that 'text ordering' or "anomalous text presentation" is a plausible model of language learnability. On a brief examination of actual first language learning in children, it is apparent that we may be able to expand the possibilities of learnability from the environment.

It is apparent that the assertion of the innateness of Universal Grammar (UG) does not rest on empirical analysis. If this is so then UG cannot be described as a faculty of the mind/brain and its very nature is altered radically. UG is most accurately described as a "theory" or a grammar of I-grammars of particular languages. UG thus acts in two directions: it is an expression of common structural properties of various extant I-grammars; and it is a guide for further research into new I-grammars. As in the construction of I-grammars, the major criteria for construction of components of UG (generally referred to as Principles and Parameters) seem to be those contingent on the formalism.

Nonetheless, UG expresses a group of postulates that do require explanation. Among these are: (a) there is a significant number of structural phenomena which inheres (at some level of abstraction) universally in human languages; and (b) these

structures (among others) must develop either prior to, or as part of, language acquisition. The body of this thesis addresses the second of these, in attempting to provide a psychological foundation for the acquisition of the Subject category in English.

2
Syncretic thought and early child language.

"(in the Nichtian glossery
which purveys aprioric roots for aposteriorious tongues
this is nat language at any sinse of the world ...)"

(Joyce 1939: 83.10-12).

2 Syncretic thought and early child language.

2.1 Introduction: The Extended Projection Principle.

If the acquired categories of UG are not innate, their acquisition requires some other explanation. The question to be answered is, "How are the principles of UG acquired, and how are the parameters[22] set?" The Extended Projection Principle (Chomsky (1986: 116), Haegeman (1991: 59-60)) requires that "sentences must have Subject positions ... at all syntactic levels" (Haegeman (1991; 315)). This is formalised in Haegeman (p59) in the unfortunately anglocentric form of Fig. 2.1.

Figure 2.1: Extended Projection Principle.

S --> NP - AUX - VP.

If the Subject category is extant at all levels of linguistic description then the Subject category is a linguistic primitive. The presence of this primitive in the learner's cognitive system, i.e. its development and/or acquisition, must be explained.

2.2 The presence of 'Subject' in early child language.

2.2.1 'Subject' and 'sentence' in child language.

The terms of formal linguistics have largely been developed in the description of the structures of 'adult' language, and more especially the language of text. Practical experiment in much formal linguistics is limited to the linguist's own introspection which, though still technically 'Performance', is the generation of speech

22 Parameters in UG are variables across languages, governing the particular manifestation of certain properties, for example word order.

outside of use, i.e. the generation of (spoken) text. Many of these terms have cross-linguistic applicability but this applicability can not always be assumed: there is evidence against the presence of a Complementiser system in Japanese (Fukui (1986) cited in Radford (1990)); many languages are without adpositions or adjectives and many languages vary in the domain of nominal and verbal lexical items (see Givon (1979)). The application of this terminology to child language is equally non-trivial and in this section we attempt to find 'Subject' and 'Sentence' in early child language.

My prototype for 'subject' in this study is to be that profiled in Keenan (1976, henceforth K76), much of which I take to be relatively uncontroversial. As Keenan was aiming for a language independent definition of 'Sentence' and 'Subject' of sentence, his descriptions are often structurally vague. Also, his definition was stated in terms of tendencies and preference rules rather than necessary and sufficient conditions. However, as a starting point I shall try and find the properties outlined in K76 in the utterances of Allison Bloom (Bloom 1973, MacWhinney 1991; and see Fig. 2.2). Allison's speech will only be noted here, to be placed in critical relation to the notion of Subject defined in K76; her linguistic performance will be examined in detail in Chapter 3.

Figure 2.2: Allison Bloom's speech files.

File	Age
Ali 1	1;1;21
Ali 2	1;7;14
Ali 3	1;8;21
Ali 4	1;10;0
Ali 5	2;4;7
Ali 6	2;10;0

2.2.1.1 The 'basic sentence'.

Although K76 is language independent, several substantive claims are made about the 'basic sentence'. 'Basic' is used here in an attempt to define a set of 'primitive' (or 'most basic') sentences from which other sentence types could be derived (presumably by operations such as 'question formation' or 'negation', although Transformational rules are never explicitly referred to). Thus a first requirement is that a "b-sentence" must not depend on or contain another or more basic sentence. These sentences will tend to be the most syntactically 'simple' of a particular language and therefore to be declarative, affirmative and probably active. For the same reason they will tend to be the most syntactically versatile, in the sense of being the easiest to modify verbally and sententially (p309). As a lower limit on the allowable basis of sentences, the b-sentence must not be "too context dependent" for its meaning (p308), so pronouns, 'missing' arguments and presupposition are to be avoided.

It is difficult to see how some of these requirements would relate to Allison's utterances: certainly utterances often stand independent of one another, but whether utterances are declarative or interrogative is often a matter of non-trivial interpretation. Allison's utterances appear to be too basic for K76, depending crucially on the non-linguistic context for interpretation. The single-word, or 'holophrastic' utterances[23] which predominate in the early files not only presuppose that reference is to be recovered from context (in the case of internally directed speech this presupposition is perhaps trivial) but that the addressee will highlight the same aspects of the lexicalised event or object as has the speaker. For examples, from 'Ali 1': *down* is used to accompany: Allison's own descent from a chair; herself accidentally knocking a doll down; and asking 'mommy' to pull her down; *cookie* is used in asking for, offering or identifying cookies.

Allison's later multiword utterances are also too context dependent to be called sentences. Arguments of predicates are regularly not lexicalised, and often predicates themselves are left unlexicalised if they are salient from the context. For example from

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23 A holophrase, after Griffiths (1986: 280), is defined as "an utterance that is about as long as a (short) adult word - and is, indeed, often modelled on an adult word - but which is used in ways comparable to a whole adult sentence. That is, it is used to perform 'illocutionary acts' such as requesting and greeting". In this thesis the term is used with the slightly broader definition as a unit with similar phonological form to an adult word, but with a function either unspecified or subjectively constructed by the child.

'Ali 3' "mommy shower" and "mommy floor" seem to be declarative and imperative utterances respectively.

However, there does seem to be some kind of structure in Allison's multiword utterances, which is to be examined briefly before we look for the 'subject'.

Before 20 months it is difficult, if not impossible, to talk of any syntactic structure in Allison's Performance, as the vast majority of her utterances (280/322 in 'Ali 1', 288/300 in 'Ali 2') are holophrastic. Moreover, the holophrastic utterances cannot be readily categorised in terms of Noun, Verb, and Preposition. Although there is a formal resemblance - that is, adult forms and child forms may share a similar phonetic form - the resemblance does not seem to extend to the use or meaning of the terms. Henceforth, in characterisation of this formal similarity and functional dissimilarity, adult forms will be capitalised (e.g. Verb) and child forms will be inside scare quotes (e.g. 'verb'). Thus, in the earlier file especially, 'verbs' (i.e. those words which bear phonological resemblance to adult Verbs) are virtually non-existent, the linguistic function of accompanying the speaker's action is invariably fulfilled by Prepositions. As implied by the term 'holophrastic', the lexical functions (Nominal, Verbal, Prepositional, ...) are only partially differentiated in early speech.

The multiword utterances, however, right from the beginning, seem to show a strongly regular word order - there being certain words which invariably occur utterance initially and some which almost equally invariably ocur utterances finally (there is only one counter example to these in the first three samples)[24]. A tentative Phrase Structure grammar can be hypothesised, formalising but not generalising beyond the attested data, as in Figure 2.3.

Figure 2.3: Phrase Structure for Allison Bloom.

Utt	-->		X	
	-->	Init	X	
	-->		X	Fin

24 For example, from 'Ali 1' to 'Ali 3' *more* and *mommy* are always utterance initial. The 'prepositions', which appear in multi-word utterances slightly later, and at first only with babble, are virtually always utterances final (there is only one counter example to this: "down mommy" (in 'Ali 2') which accompanies Allison's descent into Mommy's lap - Allison implicit as 'Agent/Experiencer', Mommy explicit as 'Goal').

Init --> *more, mama* ['Ali 1'] e.g. "more baby"
--> *baby, mommy* ['Ali 3'] e.g. "mommy shower'

Fin --> *down* ['Ali 1'] e.g. "uhoh down"
--> *on* ['Ali 3'] e.g. "coat on"

X --> Init, Fin, babble, all other vocabulary.

This word order regularity is plausibly due to imitation of the caregiver's speech. The words which become 'pivots' (*more*, *mommy*, *down*) are among the most common words of Allison's holophrastic vocabulary, and the constructions among the most common of the caregiver's utterances. An early sensitivity to word order appears to be somewhat general in language acquisition (see Schieffelin (1981) on Kaluli, Slobin (1966) on Russian). It is worth pointing out that while Allison's multiword utterances are limited to two words, the only structural relations necessary are before/after (or +/- BEFORE) - i.e. that *more* will occur before the word it qualifies and that *down* will (generally) occur after it.

Although the grammar can be simplified by condensing rules (as in Figure 2.4), the proposed rule would license structures unattested in the data (i.e. Allison's linguistic performance). Namely the string [Init X Fin].

Figure 2.4.

Utt --> (Init) X (Fin).

There are further problems with this rule beyond that of non-attestation. The first is purely formal: when a grammar can generate strings of over two elements the simple before/after relation is no longer sufficient and more structure is necessary to relate all the elements to each other. The temptation is to introduce predication of some kind, which again is not attested in Allison's performance. Predication is an important psychological development which is to be described rather than assumed. Second, a claim that Allison's basic sentence structure is [Init X Fin] allows the hypothesis that non-lexicalised participants in events are explicitly represented in the structure by

'empty categories'. For instance in the analyses of the attested "baby down" (from chair) and (baby) "down [to] mommy" in Figure 2.5. As with predication, there is no evidence for an 'empty category' in Allison's performance. On both counts it is clear that postulating only those abstract structures which are licensed by all and only the attested data can prevent the generation of abstract categories (predication, empty categories) which are purely ideal. These ideal categories become problematic when they are not recognised as such and seem to require explanation in terms of psychology or (more usually) biology.

Figure 2.5: Empty categories in Allison's linguistic performance.

['Agent'	Verb	'Goal']
baby	down	*e*
e	down	mommy

Allison's utterances may have a naturalness and wholeness which can tempt us to call them 'sentences', but on the above definition this cannot be correct. It is not until 'Ali 5' that Allison uses adult decontextualising vocabulary such as tense and pronouns. Before this the reference of most utterances cannot be understood without access to the state of affairs in the play situation at the time. Early combinatorial speech is apparently of the form of strings of holophrases (Garman 1979, Peters 1986, Ch 3 of this thesis) and its dependence on non-linguistic context is reflected in the fact that any event participant (including 'verbs') may be left unlexicalised (see Figure 2.6).

Figure 2.6.

'Ali 2'	"baby down"	accompanying Allison's descent from a chair.
'Ali 3'	"mommy shower"	'mommy was in the shower'.
	"mommy floor"	'mommy come down to the floor'.
'Ali 4'	"baby down chair"	accompanying Allison's descent from a chair.
	"there cookie"	pointing to a cookie.

2.2.1.2 The 'basic Subject'.

The definition of 'basic Subject' (i.e. Subject of a basic sentence) given in K76 consists of around 30 "properties which Subjects characteristically possess" (p311). In a wide cross-linguistic survey, parts of speech traditionally or 'pretheoretically' described as "Subject", were examined for properties - syntactic, semantic or pragmatic - which they might have in common. In other words, the initial (unspecified) definition was of the "I don't know what it is but I know it when I see it" variety - parts of speech were selected on the grounds that they seemed to be right, and their properties were added to the set {Subject Properties List (SPL, p312)}. Consequently there are properties which are purely language specific (and which are seen here as of peripheral importance) through properties of varying ubiquity, to properties of virtual universality. Counter-examples are presented to most of the proposed properties, and the set (or any subset thereof) is not a list of necessary and/or sufficient conditions for 'Subjecthood' in a language. K76 is using "a weaker notion of definition" (p312), in that "an NP in a b-sentence ... is a subject of that sentence *to the extent that* it has the properties in [SPL]". The notion 'Subject' "does not represent a single dimension of linguistic reality", it is a "cluster concept", or a "multi-factor concept". The compiled Subject Properties List is presented under four categories (autonomy, case marking, semantic role and immediate dominance), which seem to be placed in order of implicative import (p324). We'll go through them in the same order.

Autonomy.

The autonomy required of a Subject noun phrase (NP) is defined along three dimensions:

(a) the NP must have "independent existence" with respect to the action, event or state of affairs described in the predicate, for example in the sentence "Joanna was painting a picture" the picture need never exist, but the existence of Joanna is strongly presupposed.

(b) the NP should be among the most "indispensable" for the grammaticality of the sentence (this is admittedly local to accusative languages and a certain reading of 'pro-drop' constructions[25]).

(c) the NP must show "autonomous reference", i.e. its reference "must be determinable by the addressee at the moment of utterance". This can possibly be seen as a grammaticisation of (a), and it means that the Subject NP should not be anaphoric, and referentially dependent on later (or often in non-Subject initial languages, earlier) NPs. There are several consequences and related properties to which K76 seems to attach importance as there are six pages of them, which I shall pass over here as they generally concern the more advanced syntax not found at all in Allison's language, such as control of reflexives.

In Allison's holophrastic speech, it is an act of rich interpretation to posit any kind of linguistic Subject/Predicate (or Topic/Comment) split. Perhaps we might say that Allison's utterances during this period are all de facto Comments, in that they express attention on an aspect of the present situation, but the specification of what that aspect is (i.e. the Topic) is only non-linguistically present. Thus meanings are often unstable to the extent that reference is not independent of time and location of utterance. In early combinatorial speech, NPs we might want to call Subject, on the grounds of Semantic role for instance (see below), are almost always absent from utterances. Examples are given in Figure 2.7 (the implicit 'Agents' in all cases below were Allison herself). The Subject is literally not present.

Figure 2.7.

From 'Ali 3': "sit down"
"lie down"

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25 'Pro-drop' constructions are those where the Subject has been elided: in Chomskyan formal linguistic terms it has been replaced by the 'empty category' 'pro'. Typically this is limited to certain languages or certain constructions:

English imperatives:
[pro] put the kettle on.

Spanish:

jo	tengo		dolor	de	cabeza.
[pro]	tengo		dolor	de	cabeza.
(I)	have	(an)	ache	of (the)	head.

From 'Ali 4': "comb hair"
"eat apple juice"

Case marking.

The unmarked NPs in intransitive sentences tend to be b-subjects, as will be those NPs which change their case marking under causativisation and nominalisation. These properties are of course only relevant to case marking languages, and the language of Allison (before 'Ali 4' at least) has little or no inflectional marking of any kind; that which exists is best described as 'borrowing' (i.e. unanalysed rote learning) from the adult language. For examples: "gone" ('Ali 1'+), "running", "coming", "wiping" ('Ali 3'), "cookies", "toys", other '+ing' ('Ali 4'). 'Ali 4' is the first file in which inflectional marking appears to be at all productive. Subject-verb agreement and genitive case marking is only just beginning in 'Ali 5'. Allison's language prior to this stage can be said to be a non-case marking language.

Semantic role.

B-subjects "normally express" Agent of action, Addressee of imperatives, or Causer NP in causative sentences, if any are present in the sentence, and generally "the semantic role of the referent of a b-subject is predictable from the form of the main verb" (for instance, passive verbs would imply that the subject's reference was to the 'Patient' or 'Experiencer' of the action). These properties are tendencies and K76 notes enough counter-examples to claim that none of these properties are sufficient conditions for b-Subjecthood.

However, these properties are precisely those which are most consistently treated in similar manner in Allison's speech. The NP which is most systematically and for the longest time absent from her utterances is that which plays the active role in the situation described, whether that be 'Agent' or 'Causer'. It may be significant, that the most prominent cluster of features of Allison's "Subject", those which bear on situational or semantic considerations, become almost irrelevant in the feature set of the adult Subject.

Immediate dominance.

"The b-subject is immediately dominated by the root node S." This again is made as a weak claim, making clear that even without the qualification of freer word order and VSO languages, immediate dominance by the root is neither a necessary nor a sufficient condition for b-Subjecthood.

As has been illustrated, Allison does not use sentences in Keenan's sense of the word. The very existence of a 'root node' immediately dominating one or other word is unnecessary until she starts using utterances of 3 words or more in 'Ali 4' (age 22 months) at which point recognisably adult syntax is beginning. But even in 'Ali 4' the argument of immediate dominance is a particularly weak one (40/307 utterances are formally similar to adult sentences; 75/307 are similar to adult Verb Phrases, the active participants of which are not lexicalised).

It seems that Allison's "Subjects" are not Subjects in what we have taken to be a widely accepted sense of the word. That they are not 'Adult Subjects' was apparent already, but it is important to be emphatic that they are not Subjects at all and behave by other rules. From some of the argument above we may be tempted to say that children's early prototypes of Adult Subjects are 'Agents' and go on from there. Participant roles are so notoriously ill-defined however, even though 'Agent' (and to a lesser extent 'Patient') seems to be among the most acceptable in use, that use of the term in other than a lay sense is problematic[26].

In summary, the presence of a Subject category in child language is not evident in the data. As with predication and the empty category, the development of the Subject is to be described rather than assumed. Describing the child's 'subjects' under the vague term 'Agent' allows this development to go un-examined. To define precisely how Subject develops, and what are its earlier forms, it is necessary to look closely at the child's pre-linguistic behaviour.

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26 There seem to be indefinitely many participant roles documented: Source, Goal, Experiencer, ... See Dowty (1989) and Ladusaw & Dowty (1988) for proposed alternatives.

2.3 Formal introduction to syncretism.

This sub-section is intended to ground some of the concepts I will be using in the sections ahead. The particular forms of thought evidenced by the infant's and the child's practical and vocal behaviour require quite specific descriptive terms. Thus it is not adequate to use terms like *concept* with an assumed, i.e. everyday, meaning. In this sub-section terms like *concept*, *Syncretism* and *Complex* are defined away from their setting in developmental psychology later in the thesis; here they are explored in a more general sense, with reference to everyday language. Also this sub-section attempts to exhibit more explicitly the manner in which I am using terms like Abstract and Concrete, Objective and Subjective. For further reference see for examples: Ilyenkov (1974, 1982), Voloshinov (1973), Vygotsky (1986), Zeleny (1980). No familiarity with the work of these writers is assumed.

In attempting to define syncretism in thought I found it most rewarding to define the idea negatively, as it were. Exploring ideas around Syncretic thought, it seemed to me that this primitive form of thought was more qualified by the features it lacked, in comparison with more developed forms (more 'adult', more 'social', more 'rational'), than by which special features it possessed. Perhaps this is not surprising as (in this thesis) Syncretic thought stands as some of the earliest cognitive behaviour in the child, and could be expected to provide a foundation for potential development. The growth and subsequent paralysis of Syncretic thought may be an adequate vehicle for describing the development of formal categories (and by implication Universal Grammar) without innate higher cognitive functions.

I take four types of 'concept' (here meant in the broadest sense of 'form of thought'; see Fig. 2.8) moving away in stages from objectivity and formal rigour towards the Syncretic complex. In this first section the types are only defined formally, or abstractly, in terms of their more important features - in later sections certain of them (especially the complex and the pseudo-concept) will be described more concretely in the context of the linguistic situation.

Figure 2.8: Forms of thought.

(a) the scientific concept,
(b) the pseudo-concept,
(c) the notion,
(d) the complex.

2.3.1 The scientific concept.

The scientific concept (henceforth Concept, in this section) is FIXED in that neither the extension nor the intension of the Concept is free to drift on the forces of tradition (cf. the pseudo-concept, below). Nor, really, can these facets of the Concept be altered by the individual scientist (or group of scientists), for instance on a stylistic whim. The fixity of this type of Concept can be expressed by the fact that its content (either intensional or extensional) can only be changed by some kind of consented or imposed shift in the methods of description and analysis themselves (an example in chemistry may be Mendeleev's introduction of the periodic table, which fundamentally altered the concepts of the chemical elements). Further, this change tends to be of a certain type, making the concepts more concrete (i.e. expressing the relation of a larger set of abstracted features) - an example here may be the change in Newtonian mechanical concepts triggered by Einstein's work - Newtonian concepts were enriched rather than simply negated. Change only occurs as the result of CONSCIOUS, RATIONAL, and fully SOCIAL intervention.

This characterisation of the Concept is to an extent a caricature. Rather, it is an idealisation of the more central features of a certain mode of thought. Discussion of the historically specific and ideological features of scientific thought would be out of place here, though they obviously affect its content.

In two senses, the Concept is (again an idealisation of 'tends towards') OBJECTIVE. As implied above, the Concept is experienced as an object external to the individual scientist, or even, to the extent that a Concept resists tradition, to the society in which it exists. The Concept tends toward objectivity - independence of historical locale and the sensually perceived - to the extent that it relies (for it's existence as a 'scientific' concept) on its opposition to physical reality rather than to

personal interpretation, authorised or otherwise. I am imagining uncontroversial natural-science concepts as being prototypical here ('Gold', 'Mass', etc.). The Concept approximates toward the object(ive reality) by the concreting over history of particular abstracted properties of the phenomena labelled therein.

There are several stages of ABSTRACTION involved here, between phenomena perceived (by the scientists, or by their equipment), and the Concept as it stands, such that there is a large distance between the two. A common and recurrent controversy in linguistics and elsewhere is on the ways empirical data may or may not challenge a theory (interchangeable with Concept here). It seems that properties of the phenomenon deemed 'accidental' are irrelevant to the Concept. A great deal of scientific debate may concern whether particular phenomena are 'accidental' or not, and an essential part of the character of the Concept is this CONSCIOUS, RATIONAL design. The conscious separation of necessary from accidental properties is a mode of approximation toward the object.

The conscious and rational application of the scientist (or scientific team) is the primary motor for change in the Concept, i.e. change is objectively triggered. Opposition to new realities (or equivalently, a subtler opposition to already known reality, made observable by more subtle analytical technology for example) uncovers hitherto unappreciated properties of the 'set of phenomena'. Note that this methodology would tend to promote further concretisation of the Concept, exposure of earlier errors, or possibly a redescription of old properties in terms of new properties.

All 'initiated' users have equal access to this kind of concept, it has no psychological or personal content. In these terms the scientific concept has an entirely SOCIAL existence. The objective style of prose favoured in natural science journals implies not only the objectivity of the reports, but also a certain lack of claim to personal ownership, which we could contrast to the personal voice of the novelist.

2.3.2 The pseudo-concept.

The pseudo-concept is an entity which behaves in many ways like a (scientific) concept, but lacks certain of the concept's central features. As with the Concept, the pseudo-concept is a SOCIAL entity. An example may be the dictionary definition of a word, or social fixation of meaning in any (un)written lexicon. All initiated users (e.g. members of a certain social set) have equal access to and (lack of) authority over the

pseudo-concept. Pseudo-concepts are more likely to bear the marks of their makers than scientific concepts but once these ideas are released into social discourse they very much become less property of their author than an integral part of the culture (e.g. Hamlet, Don Quixote). In this case there is a great deal of sense in speaking of them as social rather than private[27].

More typical examples of pseudo-concepts might be 'table', 'knife', the socially accepted lay idea of 'gold'. These concepts are surely not trivial to define, in terms of 'semantic features', 'necessary and sufficient conditions' or whatever, but there is a sense in which they belong to the speech community as a whole and are independent of the individual's actions. However, pseudo-concepts are NOT CONSCIOUS or RATIONAL creations, nor are they so modified by scientists, lawyers or lexicographers and are purely 'conventional' in the Saussurean sense. Conscious intervention in the language to preserve this kind of meaning generally serves to differentiate certain socio-economic groups. The inventions of street slang are an example[28].

Convention and tradition are the motivating forces acting both for constancy and change in the pseudo-concept. Thus this form of concept is somewhat LESS FIXED than the scientific concept. For purposes of separation I would like to be a little inaccurate here and say that the pseudo-concept is FIXED within its milieu - that the changes wrought in the substance of the pseudo-concept act at a slow enough pace to follow changes in the community, or at least, that the changes will not be felt within individual speakers (e.g. older generation speakers who stick to their word meanings and become a little out of touch with the younger generations. Histories of the terms 'gay' and 'queer' across several generations in the second half of this century).

Change of meaning is not directed, being unconscious, and is more likely to be the consequence of metaphor (lunar and lunatic in English), irony ('ask' -> 'ax' in Black vernacular), changes in forms of life influencing changes in important properties of the concept, etc., than by a truly rational approximation to a concrete reality (though these may often overlap).

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27 This happens not only over the centuries as with 'Hamlet' or 'Iago', but can happen surprisingly quickly. For example, the word "Quark" in Joyce (1939) is employed as the archaism for 'croak' in the line "Three Quarks for Muster Mark" (p383). This was the source for Murray Gell-Mann's term 'Quark' to refer to the three postulated sub-atomic particles, a quarter of a century later. Very quickly, then, the term can become divorced from it's 'owner'.

28 This linguistic invention can effect syntactic forms, too. Madonna's use of post-sentential not ("Thanks to Lexington Labs for maximum security. Not." Madonna (1992: Acknowledgements)) and the precious constructions of Daphne Du Maurier's (1938) *Rebecca* both signal the authors as part of some particular sub-culture.

The pseudo-concept does not approximate objectivity with the drive of the scientific concept. As for its fixity however, I would like to emphasise its separation from the notion and say that it is OBJECTIVE within a local social milieu. Legal categories are perhaps a good example of this - the pseudo-concept 'mother' is made to be highly objective within a society which puts importance upon such a relation (e.g. Western Capitalist society).

The nature of the ABSTRACTION involved in construction of a pseudo-concept is less principled than in that of the scientific concept. 'Accidental' properties of a phenomenon will tend not to be included in the pseudo-concept (they will tend to be separately lexicalised if required - 'ball', 'red ball'), but the often metaphorical nature of language change shows that non-essential properties which are nonetheless strongly associated with the phenomenon can drift in and out of membership of the pseudo-concept.

Abstraction differs in two ways from that of scientific concepts; the properties abstracted toward a concrete centre will be more locally contingent, and the boundary between central and excluded properties is not entirely intraversible.

2.3.3 The notion.

The notion is another step away from the properly social toward forms of thought of the individual in society. If a pseudo- concept is described as a 'dictionary definition' of a word, then a notion may be described as the individual's own definition. Many of the features of the notion will vary with the extent to which the individual is socialised, or perhaps, to the extent to which opposition to nature is socialised within the society. Thus there are grades of variation between the highly socialised pseudo-concept on the one hand and the purely subjective complex (as the individual will be conscious of differences in extension at least, between their own notions, and those of their peer group(s)).

Ilyenkov (1982: 39-62) characterised the notion as an abstraction from the sensually perceived phenomena or as "verbally expressed contemplation" (p43). The notion attains independence of the individual subject only to the extent to which that subject is socialised, though it will only tend toward the limited objectivity of the pseudo-concept. Emphasising the way in which personal contact and debate has

impact on this form of thought, we should call it INTERSUBJECTIVE rather than limitedly objective.

In individual and social terms local historical effects are much more prevalent on the notion than on the rationally fixed scientific concept or the traditionally fixed pseudo-concept. In a relatively atomised (or unsocialised) individual, accidental and arbitrary sensual elements (i.e. personal historical elements) will have a more central position in the notion's make-up - it may sometimes be difficult to separate an individual's prejudices and personally developed connotations from the meaning proper. In a more socialised individual, prejudice and connotations may be reduced or marked as such away from the kernel of meaning. More generally, the unconsciously socialised individual will unconsciously adopt many of the 'prejudices and connotations' at large in society.

However socialised the subject, the notion is always CONTINGENT rather than fixed. Debate or peer group pressure might exert one kind of pressure for change on the individual's notions. A person's everyday experience can often put old prejudices in a new light and produce a kind of cognitive dissonance which may inhibit or confirm certain elements of the notion's meaning.

So, the boundary between essential and accidental elements of a notion is even less clear than that between those of the pseudo- concept. The abstraction from the sensually perceived is an activity which is not entirely mitigated by socialisation - it is quite plausible to consider an individual whose socialised pseudo-concept oriented notions are in conflict with elements of the notion based more firmly on personal experience. For example the anti-racist racist: who sincerely appreciates the concept of 'black person' as fully human and requiring full democratic rights, but who still holds deeply felt prejudices about crime, smell, rhythm, and just doesn't feel comfortable with black people in the room. Thus the notion is not entirely abstract from its constituent phenomena.

For our purposes however, this description of the notion is limited to the 'adult' subject - where constancy (promoted by peer groups and language and by the pressure for 'identity') is the rule rather than the exception.

2.3.4 The syncretic complex.

In exploring the pre-social complex, we are exploring the mode of thought of the completely atomised individual - if such a thing can exist and still retain internal

cohesion (see 2.4 on the development of Subjective Space-time). Lowering our idealisations a little we can perhaps see this mode as being relevant to the very young child or the individual who for some reason has not become socialised to any significant extent (wild children, autists). With no peer group or outside authority, the complex is a direct reflection of individual sensual experience - note that 'individual sensual experience' presupposes a rudimentary internal cohesion which in turn presupposes some appreciation of memory, self/other and subjective space-time.

In developing a complex, there is no outside pressure to categorise, any categorisation that does occur, any grouping of experiences, occurs on purely accidental and subjective grounds. The thinking subject receives no external motivation to establish essential and accidental properties of the perceived data and the blurring between the two characteristics of the notion is exacerbated here. Each phenomenon enters a complex whole, with each of its (perceived) properties given equal rank inside the complex. In other words there is no abstraction apart from in the purely perceptual sense (perceptual data themselves being abstractions from the object); this is how the complex can be described as Syncretic - as a synthetic complex of concrete phenomena.

Formal and concrete illustration may help illustrate this. For example, an arbitrary complex **A** derives from four situations *M*, *N*, *O*, *P*, each with the following perceptually salient features :-

Figure 2.9.

t=0	*M*;	{o,p,q}	**A**;	{o,p,q}
t=1	*N*;	{p,r,s}	**A**;	{o,p,q,r,s}
t=2	*O*;	{q,r,t}	**A**;	{o,p,q,r,s,t}
t=3	*P*;	{n,s,u}	**A**;	{n,o,p,q,r,s,t,u}

and so on. Note that not all the features of putative exemplar of a complex need be already present in the complex's extension. Any connection however tenuous can promote inclusion, if the subject is so inclined. This can be seen in a concrete situation in Figure 2.10; this shows the apparent referents of consecutive uses of a

word ("Bow-wow") by a child towards the end of his first year (Werner (1926), cited in Vygotsky (1986: 127)). This example among others is analysed in detail in 2.5.

Figure 2.10: "Bow-wow"

day

251 a china *figurine* of a girl;
307 a **dog** barking in the yard;
the *pictures* of his grandparents;
a *toy* **dog**;
a clock;
331 a **fur** piece with an animal's head
(with glass ***eyes***);
a **fur** stole without a head;
334 a rubber *doll* that squeaks when pressed;
396 his father's ***cufflinks***;
433 pearl ***buttons***
on a dress;
a bath thermometer;
...

In principle there is no reason for this instability in extension to stop; there may be practical considerations, however, which might promote compression and abstraction. Indeed it is interesting that syncretism is unstable in terms of its extension and that the very formal characteristics of the Syncretic complex are equally unstable. As the content of a complex increases and becomes more cluttered, more common or more strongly reinforced (by peers or caregivers, for example) features will attain more salience than those which are rare or deemed unimportant by others. A category comparable to the 'prototype', 'family resemblance' or 'preference rule' arrangements (Jackendoff 1984) emerges. It seems that abstraction is not something which is done or not done, but a property simulated by certain heavily encumbered Syncretic complexes.

2.4 Substantive introduction to syncretism.

2.4.1 Neural behaviour and learning.

Having introduced Syncretism formally via an elimination of features from formal concepts, we arrived at a characterisation of syncretism as a kind of subjective and unstable categorisation of phenomena. To develop a picture of how this mode of thought is instantiated in the child it will be fitting to examine how Syncretic thought is synthesised ontogenetically from even more primitive modes of interaction with an external world. Syncretism is not innate, it is not the starting block, but it is a necessary milestone on the road to socialised thinking.

The functional and psychological foundation for Syncretic thinking will be laid in terms of Piagetian Schematic structures and the processes of Accommodation and Assimilation (Piaget 1953, 1955). The development of these forms is a continuous process and the transition into more advanced Syncretic forms is gradual rather than piecemeal. Although notions of 'stages of development' are somewhat antithetical to this approach, they can be useful in providing landmarks in exposition, and such is their use in this thesis. The Piagetian processes themselves are not to be taken as innate but are to be grounded in a reading of neural processes.

The description of cognitive development is often perceived as a dilemma between on the one hand postulation of innate abstract structures and on the other hand postulation of *tabula rasa*: that the neo-nate is born with no internal structure at all. This latter position is often held to be inadequate in describing the species specificity of much of human cognitive ability. The third course, which is programmatically plotted in this sub-section, is to describe the development of higher order cognitive behaviours from simpler biological (i.e. neural) functions which can uncontroversially be postulated as innate. The question becomes: What can be explicitly identified as biologically given and what can be inferred from that?

A pre-emptive caveat here is that I may be in danger of having a naive trust in the methods and results of the 'hard sciences', as perhaps may Chomsky with respect to those of high energy physics. However, the methods and results of neural biology are often and easily reproduced and speculative generalisation is equally simply

tested[29]. Caveat notwithstanding, there are certain properties of neural behaviour which can be used as analogues for primitive cognitive processes. These are explored below.

Many of the studies cited here (Kandel & Schwartz (1981), Lynch et al. (1984), Scientific American 241/3 (1979)) are not studies of the human brain in particular. It is to be noted however, that the basic functional properties of neural matter are similar in the most divergent organisms: the differences are consequent on the volume of sensory, motor, and inter-neurons, and the complexity of their inter-connection (see Kandel (1979)). This raises an interesting question regarding the species specificity of language and whether it has to do with factors not purely neurological: it is important to realise that biological specificity is not restricted to the structure of the brain.

It seems significant in this regard that the human foetus is born 'premature' with respect to its higher primate cousins, that is . In animals, the much more limited potential for learning may be because much of the neural structure has 'stabilised' leaving room only for some gross environmental adjustment and some basic learning. An example may be the extent to which myelination and neural cell death (by means of which the final structure of connections is arrived at) is carried out before birth (see Skillen (1993) on the role of myelination in the human infant). Note that this is a quantitative difference not a qualitative one and that some apes may thus be capable of learning limited linguistic communication systems.

The following elementary neural behaviours are found in the invertebrate snail *Aplysia* (Kandel 1979). *Aplysia* is an organism of extremely limited neural population, the central nervous system of which can easily be mapped (to the neuron, in fact) and investigated. Although it certainly beggars the imagination to compare such a creature to the human, it seems to be the case, as mentioned above, that neurons are of essentially the same character in a very wide range of animals. Differences are generally provided by profusions of processes (dendrites (input) and axons (output)), presence of inter-neurons (which connect between neurons rather than between nervous system and sensory or motor device), and sheer neural population size.

Three types of elementary response to stimuli have been characterised as types of 'learning'. The biochemical and structural details can be found in for example Hawkins & Kandel (1984) (and citations therein) and do not concern us here. These

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29 Unlike speculation in quantum chromo-dynamics, for example, which may therefore be of a qualitatively different nature.

basic functions have become known as Habituation, Sensitisation and Classical conditioning.

Habituation refers to the decline in neural response to a stimulus "the consequences of which are neither noxious nor rewarding" (p387). The higher invertebrate *Aplysia* will withdraw its gill & siphon apparata when the siphon is given strong tactile stimulus. On repeated and inconsequential stimuli the response decreases (in this case the actual output of the sensory neuron) and eventually the stimulus is effectively ignored. Habituation is not associative in that there is no association being made between external elements, this process is a response to a (repreated) single stimulus.

Sensitisation like Habituation is not properly associative. Biochemically it is more complex than Habituation, though its effect is almost exactly opposite. In *Aplysia*: if for example, the tail is given a strong noxious stimulus (the 'sensitising' stimulus; a.k.a. unconditioned stimulus (UCS)), a following stimulus to the siphon (the conditioned stimulus (CS)) will produce an enhanced response. Axons from the sensitising sensory neuron are synapsing onto axons of other 'defensively oriented' sensory neurons, thus magnifying their subsequent output. This is non-associative in that no reciprocal sensitisation occurs and there is no sense of a link being made between two parts of reality, or even of the nervous system itself. A sensitising stimulus would produce something like a general mood of apprehension.

Classical Conditioning is a special case or an elaboration of sensitisation caused by a recurrent temporal pairing of two linked stimuli (i.e. the UCS and CS above). When a weak CS is followed (about .5s) with pronounced regularity by a strong UCS the response is greatly enhanced - much more so than is a sensitised response. This enhancement soon extinguishes, however, if the regularity of the temporal pairing is lost. Enhancement also deteriorates if UCS precedes CS, so the elaboration of Sensitisation is not yet qualitative and though this learning function is technically associative, the association is of a limited, uni-directional kind. This associative learning can be interpreted as an internalisation of some regularity in the environment.

Higher order learning functions such as Generalisation and Second Order Conditioning can be described as further elaborations of the above functions, especially once the role of inter-neurons is appreciated (much of *Aplysia's* central nervous system (CNS) is monosynaptic - sensory neurons synapsing directly on motor neurons).

Generalisation: There may be "some overlap in the sensory neurons and interneurons excited by different stimuli" (p392). That is, stimuli local to the CS may have an effect functionally similar to the CS itself - if several stimuli (sensory neurons) synapse on the same interneuron, only one of which being a CS, the interneuron's output may be enhanced whichever of its inputs are fired. To put it another way, stimulus of the interneuron itself becomes the CS.

Second Order Conditioning: regularities between occurrence of CS_1 and another stimulus (CS_2) may produce further conditioning - CS_1 becomes a sensitising stimulus for CS_2. This kind of conditioning crucially depends on layers of facilitator neurons (interneurons which enhance neural response generally - like internal sensitising stimuli) and other interneurons which provide a pathway between the loci of the communicating peripheral stimuli. This form of learning is too complex to occur in *Aplysia*. As with Classical Conditioning, each occurrence of regularity strengthens the response, but unlike Classical Conditioning, the association here is not unidirectional - neither peripheral CS need be a sensitising stimulus in itself, as the sensitisation is done by the facilitating interneurons. With these second order learning functions we begin to see true association between local or distally related sensory phenomena.

Much of the enhancement or reduction of signal is permanent or semi-permanent in effect. The permanence of the changes is qualitatively greater when they are occurring within the immediately post-natal cell-death period of neural development. In the pre-natal period neural material and connections are vastly over-produced, such that up to 80% will die in this post natal period. Major determinants of this cell-death are amounts of stimulus received and of "trophic material available" to receive the neuron's own signals (Cowan (1979), Skillen (1993)). Very early learning, then, may have a marked and permanent effect not only directly in terms of the associations which are internalised, but indirectly in terms of the potential for later association created or ruled out by selective cell-death (neurons do not grow back after birth).

These are the properties of neural matter, independent of the host organism. The elementary neural behaviour of the human central nervous system is constrained within the same vocab[illegible]el 1984). It is notable that much of the biological endow[illegible] be based is not species [illegible] postulated is the birth of the human infant at a much earlier st[illegible]development. This rather gross

difference allows epigenetic development in a neural population of a higher order of magnitude. So, to instantiate these neural behaviours into the human:-

(a) The layer of sensory and motor neurons. In the human brain (as in that of most higher mammals) there is an accompaniment of large numbers of interneurons, even at this level, quite outnumbering the peripheral nerve cells proper. Their function seems to be to systematise in various ways the sensory inputs (and the motor outputs) and to smooth interfaces and local co-ordination (see Hauta & Fiertag 1979): hence they seem correctly to be part of this layer.

(b) A small number of elementary 'learning functions' or processes, such as Habituation, Sensitisation and Classical Conditioning. These may be reflex (e.g. monosynaptic) or local (e.g. a retinal cell may provide sensitising stimulus to adjacent cells). . Much of the interneural operation in layer (a) will be of this elementary kind. These elementary functions are intended to be taken as a kind of taxonomy of neural processes or techniques general to the brain.

(c) Layers of interneurons creating a regime of second order learning functions such as Generalisation, Second Order Conditioning (or Association) as well as a kind of second order Habituation/Sensitisation occurring between interneurons.

These layers are almost literally superimposed on each other in the brain's construction: much of the sensory and motor system is found in the lower brain, while higher order processes are in the cerebral cortex, which develops last ontogenetically as well as phylogenetically. It should be noted however that Sensori-motor faculties are not quite as discretely distributed as the mapping of the brain into sensory 'lobes' can often imply (see Hauta & Fiertag (1979) on lobic interpenetration).

Translated into a functional or psychological terminology we have a number of isolated sensory and motor systems mediated by a field of connective possibility. These isolated systems can be translated as Piaget's Primary Schemata - elementary local abilities such as vision, hearing, local touch sense and local motor ability . The helplessness and physical disorientation of the neo-nate is evidence of the separation of these Schemata: lack of balance and proprioceptive skills indicates that basic regularity and co-ordination between parts of the infant's body are not 'hard wired' but must be learned. It is also quite some time (in days or weeks) before the infant responds directionally to sounds or tactile stimulus (Piaget (1953)).

Accommodation and **Assimilation** are associative functions mapping to clusters of the neural learning functions of layers (b) and (c) (and possible others of the same kind). They are properties of Schemata, not individuals, and the 'environments' over which these functions have their domain are external and internal

with respect to the particular Schema in which they operate. The external environments of secondary and 'tertiary' Schemata are generally other inter-relating Schemata, primary Schemata will have both other Schemata and the 'outside' phenomenal or sensual world as external environments. Accommodation and Assimilation are properly to be spoken of as *concrete* processes: there is no explicit force to unify or categorise phenomena as there is in the building of Syncretic complexes. Accommodation and Assimilation are functions over the immediately appreciated phenomena only - external and/or internal.

The internal environment is the internal structure of the Schema itself. I characterise this as an 'environment' to emphasise both the 'mirroring' function of the Schema, and its somewhat 'organic' nature. The structure will change over time as the Schema grows, agglomerates with others and decomposes; and the 'historical' specifics of this structure will have an active effect on how new data are Accommodated and Assimilated.

Piaget describes the **Schema** as a "practical concept" (Piaget 1956); a Schema may also be seen as a behaviour pattern or as a concrete internalisation of associated external stimuli . **Accommodation** is the immediate reflection of sensation within the Schema - the initial stage of internalisation, and possibly the creation of a 'phenomenon'. **Assimilation** is the internal procedure or effect of the Schema's Accommodations to its external environment. Accommodation will always occur when the Schema is active; Assimilation generally effects reinforcement or entropy, possible associations with other Schema(ta) and so on.

Much of the description and exploration is beginning to take on a rather formal character. In future sections, we'll be talking less in terms of neural structures, rarely referring even to the biologically based first and second order learning functions (Habituation, Sensitisation, Conditioning, Association, ...), preferring the abstracted forms of Assimilation, Accommodation, and relations between Schema. Part of the claim of this section has been that only biological processes (e.g., of the brain) can be biologically endowed. Higher order processes (e.g., of the mind) are best described in more abstract formal terms, and it may not be simple to provide direct biological mappings of 'Assimilation', 'Accommodation' and 'Schema'. However, a pathway for the transition between biological and cognitive functions has been provided.

2.4.2 The Initial State Device.

The 'Initial State Device' (ISD; a.k.a. neonate, infant) consists of some innate reflexes (or Primary Schemata after Piaget) and the associative functions. The first stage in its development (much of the first month) exhibits behaviour consonant with 'practising' or 'tuning' these reflexes - sucking, prehension, hearing and vision. Evidence of activation of Schema in vision and hearing is at first only available 'negatively': the infant may stop doing something else when presented with something in the visual or aural field (Piaget 1953 p63, 77). Each reflex seems to operate alone and it is some 6 weeks or so after birth when "Second stage" Schemata are evidenced behaviourally (see below). This functional isolation within the ISD has several suggestive implications.

In the canonical Von Neumann digital computer architecture, a capacitor produces a central 'clock pulse' which regulates activity throughout the whole machine - local elementary functions are carried out one at a time on each pulse. As well as keeping digital processes out of each other's way and allowing predictable input & output times, this clock pulse provides a central rhythm about which the machine can cohere. The space-time that the Von Neumann Central Processing System inhabits is a unitary one. Such a central clock has not been found in the organic brain. The timing of neural operations is entirely local and heterogeneous: speed of operation not only varies between types of neuron, but also between parts internal to the neuron (dendrites, axons, areas within the body). Until the Schemata begin to communicate systematically there is no reason to impose a cohering central rhythm[30]. Each isolated Schema will have a rhythm of its own.

Thus, the notion of **time** in the Device (really a system of devices at this point) is interesting. Piaget proposes local "practical durations" (Piaget 1956 p322), each a property of a particular Schema, Piaget's stress being on the practicality rather than the locality. Even the sense of 'duration' only comes when a reflex is able to consistently dissociate Accommodation and Assimilation in its action (e.g. into phenomena and effication). The Device's internalisations of objective time are only indirect: as a number of rhythms or (slightly later) durations. These internalisations are not 'subjective' in that there is yet no evidence for a single 'subject' imposing or creating order.

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30 Apart from the circadian rhythms of sleep and hunger, which seem to effect the body quite holistically. Significantly, these behaviours are also somewhat arhythmic in the infant human.

The same course of argument applied to **space** produces a similar result. The evidence is that prehensile and gustatory reflexes are local and that even proprioception is an "acquired adaptation" (Piaget 1953) - the hand will grasp when touched, only to release its object soon afterwards; there is little or no co-ordination between parts of the body in motion. Appreciation of objective space is also then local and practical in the sense that each Schema or reflex has its own internalisation of 'space' based on its own extension and behaviour. Piaget replaces the term 'space' with 'group' to express the idea that internalisation at this stage expresses a clustering of surface phenomena and it implies no awareness or appreciation of three dimensional extensibility outside the Device.

Objective space becomes a number of local groups. Description of 'group-space' as two dimensional (modelling the skin surface, for example) is possible though questionable on two counts: first it is unclear in what sense it would helpful or meaningful to postulate that a Schema does indeed represent the skin surface in two dimensions; second, until the Schema are communicating one Schema's (x_1, y_1) would not be related to another Schema's (x_2, y_2).

The Initial State Device, then, inhabits a number of practical time-spaces, which do not constitute a *uni*verse. Nor do they yet entail any particular external reality.

2.4.3 The suckling infant.

Sucking is an example of the activity of this Initial State Device and as it is present from birth it can be said to be truly innate. The reflex is purely impulsive at first, apparently triggered by any object brushing the lips, and coordination of sucking and swallowing in breast or bottle feeding is generally present on the first day - though not always successful initially (Piaget 1953 p25). No other co-ordinated behaviour is present in the neo-nate, such as holding objects in the mouth while sucking, or searching however primitively for the desired or escaped object. The activity of the *suck* reflex is totally isolated from other reflexes and developing Schemata, until this coordination with swallowing. Within the first few days of life forms of behaviour are developing around the *suck/swallow* Schema.

The infant may on occasion appear to exhibit search behaviour: for example, searching for a missing teat and becoming upset at its lack of success. However the make-up of this 'search' is significantly different from the search procedure of the

developed child or adult. The infant will repeat its *suck/swallow* Schema and "his lips open and close as if to receive a real nipple, but without having an object" (Piaget 1953 p26), each execution of which separated by some apparently urgent head movement. This head movement is evocative of the search, but on further observation seems to be quite undirected. Each burst of movement is unique and unconnected with previous and subsequent bursts - even when, for instance, the infant's cheek brushes against the teat during one adjustment, the head will not necessarily subsequently turn in that direction. This head movement possibly internalises an association with some head movement and the presence of the teat in the mouth, but no further, perhaps it merely constitutes non-relevant activity which can shake the mind clear as it were, to restart the *suck/swallow* (or some other) Schema. In Piaget's diary accounts, it is around 3 weeks before even a limitedly directional response is evident in this Schema (and 3 weeks is a long time if we consider that feeding is perhaps one of the major activities of the neo-nate). There is as yet no assistance from vision or the more remote gustative Schemata.

This procedure and its subsequent development is fully compatible with an active pattern-matching account of infant cognition. The *suck/swallow/nutrition* association is plausibly one of the strongest sources of stimulation and hence connection strengthening in the initial state device. In the absence of consciousness of an objective external world, stimulation of one half of this association is expected to lead to stimulation of the other half, and so far the modal response to failure is anxiety, symptom of cognitive dissonance. In other words, the association is internalised before the objective causal relation.

The later directionality in responses to failure can actually be boiled down to "turn in the direction of the cheek that was stimulated" and there may be an internalisation of the general success when this is tried. If the *turn* Schema fails once there is no evidence of memory or a limiting of the search space and the infant is back to square one with increased anxiety. What is important about the *turn* Schema is that it illustrates the relations growing between reflexes, building Schemata. Here, local but functionally separate reflexes - *suck/swallow* and cheek sensation - are becoming connected due to some form of classical or 2nd order conditioning. In Accommodation to the elusive nipple, cheek sensation is being Assimilated to the *suck/swallow* Schema. But still this is not a search for something external to the Device.

This Assimilation also illustrates the expansion of the local time-spaces: Schemata like *suck/swallow* have virtually no temporal depth at all and 'expectation' and 'memory' have meaning only as names of moments during its activation, a function of the properties of the neural mechanics. After Assimilation of cheek

sensation a bond is established between two heterogeneous time-spaces, necessitating some higher order time-space which can include them both. On a neural level, biochemical processes will drift into rhythm to the extent that they are strongly connected.

The development of *suck/swallow* into a Schema is very rapid and it is important not to get ahead of oneself in the general story. As the Initial State Device is a heterogeneously composed entity, different areas of cognition will develop at different rates, depending on their level of activity and for various reasons it is plausible that *suck/swallow* be 'ahead of its time' at these initial stages (see below on play). However, these associations between reflexes around the month end should not be seen as moving towards an appreciation of causality and external space-time. In the infant's time-space multiverse, it is very difficult to find anything relating to our conception of 'object' or 'event'. The peripheral phenomena which associate into Schemata are atomic: separate and treated uniquely in themselves. There is no general associative web, which might internalise a sense of externality, of being in the world. There is equally no thing apart from these peripheral phenomena, anything which might be construed as a 'self'. The Initial State Device has neither outside nor inside, only the membranous layer between both.

2.4.4 The Social Environment.

It is not implausible that a factor in the rapidity of development of the suck/swallow Schema is caregiver assistance. The infant, helpless in these first days, is at almost all times accompanied and assisted or at least within sight & earshot of a Primary Caregiver (PC)[31]. The Initial State Device is not forced to seek, find and manipulate its own sources of nutrition. The Caregiver provides sufficient assistance such that only tasks within the Device's competence are required of it to perform. The

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31 I use the term caregiver to avoid as much as possible assumption of historically specific modes of child rearing. Terms such as 'mother' or 'parent' are obviously leading in terms of sex and biological relationship between caregiver and infant. Though I am more or less forced to use a singular noun, I am not assuming even that the caregiver is a single person, merely a single abstract role that an unspecified number of concrete individuals may perform. Examples of such concretely multiple caregivers may be the extended families of some working class child rearing situations, or the peer group child rearing techniques of Samoan children (Ochs 1988).

The Primary Caregiver is an abstract individual, present from birth and the person most in harmony with the infant.

infant does not struggle and gasp long in cognitive dissonance before the teat is provided, even placed into the mouth[32].

From a very early age the infant inhabits a Social Environment, by which is meant a section of experience within, but functionally different to, the purely physical environment. This Social Environment has its own properties of interpersonal dynamics which characterise people as a special kind of object, it also provides a 'Commentary' on the associated physical environment. Social Commentary is significant in two ways: it can facilitate and accelerate the infant's cognitive and physical development; and it can consolidate the associations that are being made in such a way as to allow a profundity of appreciation, which may not develop in more contingent development.

There are particular moments of intervention when Social Commentary becomes especially effective and these are examined below as they arise. Obviously, as the Social Environment is basically supported by the physical environment, its operation must be congruent with the child's own changing *Weltanschauung*. This operation will be quite different in the time-spaces of the neo-natal Initial State Device, and the subjective universe of the 9 month old Language Acquisition Device.

The Social Environment of the Initial State Device amounts to the basic sensual reflections, and associated phenomena, of the objective presence of the PC. Indeed, at the earliest stages it may be very difficult to differentiate the internal stimuli corresponding to caregiver presence from the innate or associated responses they incur. An objective characterisation of the PC would be couched in terms of feeding, care and familiarity from the neonatal period onward and it is the behavioural cognates of these we should look for in search of evidence of a Social Environment present to the infant. In other words, evidence of internalisation of the objective association between feeding, etc. and PC presence.

There are various perceptual clues available to the Initial State Device relevant to PC presence: smell; sound (e.g. of the Primary Caregiver's voice); Trevarthen (1979: 333) cites evidence arguing for innate mechanisms aiding face recognition. If these have become associated with the contentedness and alertness resulting from feeding, care and attention inside the Initial State Device it is possible that some variety of 2nd order conditioning occur, enabling PC presence itself to be a stimulus triggering contentedness, alertness, and so on. Trevarthen (1987) notes various

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32 The Assumption of a healthily operative social environment is another abstraction from the variations of concrete reality. The mental dysfunctions which result from even everyday abuse or neglect (for example, autism, phobias) are a subject for further research.

studies (p184-5) which hint at such conditioning, noting "... a great sensitivity of the infant's inner cerebral state of arousal or excitement to human attention" (p184) and that "consciousness within a maternal [sic.: read Primary Caregiver] maintenance and holding" (p185) is correlated to attitudes of motivation and learning in the infant.

On one level this is nothing more than a rigorous confirmation of the common-sense prejudice that if you're nice to your baby, your baby will be happy. On another level, we might say that PC presence, or the cluster of stimuli that are its internalisation, comes to be a sensitising stimulus (just as we might say that the lack of such a cluster becomes inhibitory). PC presence stimuli are associated with virtually all types of cognitive activity from very soon after birth (Trevarthen (1987) goes further to mention pre-natal communication[33]): feeding, care and especially play, when the child is systematically challenged by its social and physical environments. Henceforth this cluster of stimuli (note that this could include the smells and sounds, say, of several people) will be referred to as PC presence; and PC presence will be referred to as a 2nd order sensitising stimulus - 2nd order because there can be no assumption of any hard wired sensitising operation as occurs in *Aplysia* (see above), but that this sensitisation is a form of connection/association between inter-neurons.

So this generalised sensitising stimulus is the primary characteristic of the Initial State Device's Social Environment. It is interesting to contrast its generality and unity with the heterogeneity and isolation of the time-spaces of the physical environment[34]. Given the amount of time the infant spends in different activities in close PC presence, this is not surprising.

Several of Trevarthen's articles (e.gs 1979, 1987, 1990) follow the development of this Social Environment over the first few months of life. Much of this work is based on experimental observation of mother/infant dyads. Audiovisual recording allows analysis of such subtle details as relative timing of gestures, or of small actions which may otherwise go unperceived or unremembered. In other words, a rigorous Piagetian methodology enhanced by the use of modern technology, and Trevarthen himself makes this analogy (1979; p322, 331). However, Trevarthen's richness of interpretation is a departure from Piaget's minimalism of hypothesis and there is a consequent exaggeration of claims made for the Initial State Device.

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33 'Pre-natal communication' seems to have little relevance to cognitive and affective development - the young are socialised perfectly well by biologically unrelated and by non-female PCs.

34 Indeed, one could almost say that the Social Environment is prior to the physical environment in the infant's development.

'Prespeech' (1979), 'Innate intersubjectivity' (1987, 1990) and 'Protoconversation' (1979; a term shared with Halliday (1975)) are all terms describing interpreted infant behaviour within the first months of life.

Necessarily, given the infant's helplessness, activity in the first period is limited mainly to interaction with a caregiver, i.e. within the Social Environment, rather than with purely physical objects perceived as such. Much of this play has an obvious function of expanding and strengthening the infant's physical abilities and its attunement with the physical world - 'tig' or 'come here' games, 'walking' games, various grasping and attention games. Trevarthen focuses on the purely social or interpersonal aspects of infant play with the Primary Caregiver[35].

Two quite startling features of this early interaction are indeed passed over by Piaget, possibly due to his less technological observation apparatus, probably due to his bias away from socialisation proper in favour of a solo 'young scientist' model of cognitive development (see Vygotsky's criticism of Piaget in Vygotsky 1986). These are the facility of facial imitation, especially of emotive expression, and the 'Protoconversation' conducted in 'Prespeech'. Both of these begin to occur around 6-8 weeks.

Trevarthen seems to be anticipating later events in the behaviour of the Initial State Device and thus, at a certain level, denying the reality of change. This continues when Trevarthen asserts that these behaviours are not only early developers, but are innate. It is important, for clarity of exposition if for nothing else, that entities which are postulated to be biologically given, i.e. innate, must be (a) actually present at or around birth[36] and, more importantly, (b) accessible to a description in purely biological terms. It is equally important not to anticipate in terminology the development one is attempting to describe. Facial imitation and Protoconversation can both be broken down into behaviours which require less hard-wiring.

On facial 'imitation': there are two relevant processes which we can fairly uncontroversially describe as innate. Some primitive expression of emotion seems to be innate - Darwin's celebrated (1872) work showed facial expression similarities between human and various higher mammals (Trevarthen 1979 cites various cross-cultural studies showing evidence for a "pan-human 'vocabulary' of human signs.").

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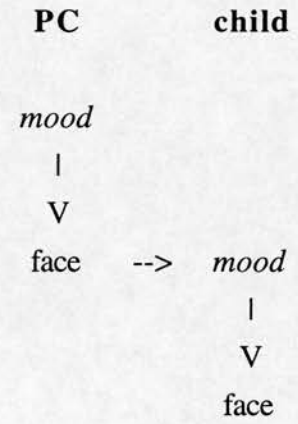
35 Trevarthen uses "mother" throughout (see note 3).

36 In other words, I do not take entites which are the product of development, even if that development may be purely 'biological' to be strictly innate.

Presumably there is some hardwired mechanism associating certain gross brainstates with facial muscle activity[37]. Also, there does seem to be some innate reflex which attracts the neo-nates attention to face-like patterns (Trevarthen 1979 p333 cites a range of studies) - though I think this could only be described as 'face recognition' in the same sense as the herring gull chick's tendency to peck at anything with a red spot on it could be described as 'beak recognition'.

Infants under one month of age "mimic expressions of adults"[38]. It must be stressed again that much of this time will be spent actively in the company of the PC. Also, one can imagine that, in the infants life outside the laboratory and especially around the times when the PC is getting tired, frustrated or angry, the infant will learn to make rather accurate associations between the PC's expressions and its own internal emotional states. 'Imitation' may be a secondary product of a more indirect chain of associations (see Fig. 2.11).

Figure 2.11.



'Prespeech' (e.g. Trevarthen 1979 p327) seems to be a similar rich interpretation of the infant's behaviour - not only does the term itself imply that the endpoint of development is already present in some way, but inferences about non-behavioural states based on these ends of development are also made. For example,

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37 Note that this animal hangover only really has effect on primitive humans (children, mentally handicapped, social naifs). Like use of contraceptives and our 'drive to procreate', this biologically determined factor of our behaviour is routinely over-ridden in advanced society - from poker-faces in poker, through tics and fidgets of the repressed, to the formal anger of the actor.

38 Trevarthen 1979 p331.

"infants appear to express rudiments of *intention to speak* " (p327, emphasis added). The behaviours observed are lip and tongue movements which "differ from adult speech and are usually not voiced"; they "exist at birth" but become "much more distinct by the second and third months" which is the period during which most of Trevarthen's filming was done. The movements appear to occur at times of face-to-face communication (especially during episodes of excitement) with a Primary Caregiver. It seems just as adequate to interpret this activity as a special case of 'facial imitation'. Another thing to note about this period is that the infant is not a calm and still body as a rule, especially when active. The 'motor restlessness' that Piaget (1956) comments upon is general. This oral activity may happen to be functionally preparing the infant for speech but it is not necessarily part of some pre-existing speech-Schema already.

2.4.5 Assimilation between Schemata.

From around 3 months changes are noted in the infant's behaviour (e.g. Trevarthen 1987 p188 - "Gradually the mother falls from almost the only attractive event in experience ..."). The increasing strength of the child's body is accompanied by an extension of the scope of its restlessness - which up to now had been limited to 'wriggling', lip movements and facial 'imitation'. The child will now begin to move around a little of its own, always under the watch of the PC, and this broader activity will enable important new associations about the Device's physical environment (external and internal).

Associations in the internal environment will be primarily in the sense of proprioception. The Sensori-motor reflexes will now be much more active and challenged and it is this period which establishes associations amounting to senses of balance, orientation and a 'self-awareness of the body' (i.e. knowing where your arms are without having to look)[39]. A second associative development is that between prehension and things seen. Much of this will indeed be encouraged by proprioceptive development - the presence of the child's own body parts in its own visual field - but also accidental collision with foreign objects will inspire association between certain interruptions of the visual field and tactile shock.

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39 It may be interesting to look at how prison babies may be affected by their lack of opportunities in this period - cockroach infested playrooms confining the child mainly to its cot; (See Guardian reports Mar/Apr 1992).

Reflexes and Schemata are being associated together and new Schemata are being formed. In terms of the physical environment(s) the infant inhabits, the local time-spaces are grouping in larger units, and as proprioception develops time-spaces may incorporate non-contiguous parts of the child's body (e.g. the time-space for a crawling Schema may incorporate limb extremities and a constructed 'centre-of-gravity'). Schemata may also begin to cross modalities: the new grasping Schemata will associate sensations from visual and prehensile input, where earlier grasping actions were apparently insensible to visual stimuli and only responsive to local tactile stimuli: for example the hand would grasp when palm was touched (Piaget 1953 Ch. 1).

The tendency here is obviously toward an internalisation of space-time which incorporates together the child's whole body as well as associating across all modalities. This is a long way off, however. There have been no behavioural changes implying a move away from the activity specificity of the Schemata, so there is no cause for Schemata which are not associating strongly to overcome their heterogeneity - the child's environment is still fragmented.

One important development is that of something we might call 'Attention'. At the earliest period of development (Piaget's Stages I & II) Schemata are largely reflexes, that is their state of activity is automatic or continuous - given excitation in sufficient part of the Schema the rest will activate. Consequently the state of the internal environment (e.g. hunger, body temperature) has a strong influence on behaviour. In this slightly later period of development, reflexes are less dominant as a determinant of activity - the child's internal environment is more stable and its regulation is not such a constant stimulus. Attention may be used to describe the resolution of 'competition' between several Schemata which may all be compatible with the Device's current state. Some Schemata may of course be activated concurrently, but for those which may not it seems simplest to propose that the Schema most fitting with the Device's present state will be the one activated. Notice that this model of Attention neither presupposes nor requires Intention or Consciousness of any meaningful kind[40], in fact no level of awareness higher than the Schemata themselves. Attention does not require a Self.

Much cognitive dissonance may be caused at this stage by these conflicting Schemata, where later this dissonance may result in anxiety, here it is just as likely to result in abrupt breaks in Attention (still a fragile and undirected thing). Another

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40 The unit may even be asleep.

consequence of the general expansion of Schemata is that earlier perceived regularities may now suddenly become irregular, alternatively, irregularities which were beyond comprehension are making new associations difficult. Although an Associative mechanism may have little trouble with irregularities (they just won't be associated together), a group of events which demonstrate regularity on an irregular or apparently random basis may be a source of anxiety - associations constantly being built and destroyed.

An instance of this unpredictable regularity might occur with the newly forming associations between prehension and sight. Specifically, some interruptions of the visual field will regularly accompany tactile shock and some won't, in other words the appreciation of distance, of something being 'out of reach' will begin here (Piaget 1955). This appreciation can build 'naturally' as it does with animals, through interaction with the physical world, but the human infant's Social Environment increasingly has a Commentary function.

It is noteworthy that while the physical environment is a fragmentary collection of 'locations', the Social Environment is the one uniting influence. PC presence has been identified as a generalised sensitising stimulus (see above) - activity may be physically no different, but it is primarily within this enabling environment that cognitive growth occurs. Thus, the Social Environment acts as a 'flag', delimiting a portion of the physical environment as available for constructive 'Play'. This function is initially merely enabling, we shall see that as the Physical Environment becomes more complex, the Play Area increasingly becomes a simplified bubble of reality in which the infant is guided to make inferences.

2.4.6 Subjective Space-time.

The merging and growth of reflexes and Schemata is a process of quantitative change, leading eventually to qualitative differences in the relations of Schemata to each other and in the coherence of the phenomenal 'world' which the child inhabits. Previously, individual time-spaces were more-or-less completely separate and unassociated. Local reflexes like *suck/swallow*, *grasp*, etc. would expand their localities through experience - for example the directional adjustments, reminiscent (to an observer) of a 'search', when a milk teat touches the infant's cheek. As the infant moves away from immediate and constant PC care (up to midway through the first year), localities are associated which may earlier not have been involved in salient or

comparable Schemata. For example, experience of balance and crawling about will associate distal body parts and construct virtual locations like Centre of Gravity. A location in terms of the time-spaces is not necessarily a single bounded area, nor even a 'real place' at all (c.f. phantom limbs, and so on, Sacks (1985), for the subjective reality of 'locations').

While inhabiting the time-spaces, 'activity' as a concept is almost subsumed under the automatic life process of the locations. The action of the *grasp* reflex is similar in its automaticity to the retraction of Aplysia's gills; and even slightly more developed Schemata like *suck/swallow* are triggered and moderated almost entirely by Schema internal processes. "Behaviour" is probably a better term than 'activity'.

This picture becomes harder to maintain when Schemata begin to associate across modalities: for example vision and prehension, more generally directional focusing and attention attracted by sound or touch. The 'distance' between modalities is of a higher order than that between areas of the body - in an external sense and also in an internal/neural sense in that the modes come into the brain from different 'entrances' and can only communicate through quite substantial intervening layers of interneurons (Nauta & Feirtag 1979).Internalisation of cross-modal regularity may require quite a lengthy chain of connection. The possibility of 'accidental' or 'weak' associations being made is much greater than with associations within a single mode.

A corollary to this may be the generation of Schemata which are equipped to liaise between other Schemata, or which themselves provide stimuli for Schemata. For example, the process of focusing attention outlined above may cohere into an *attention* Schema; this kind of Schema develops associations between other Schemata. As an effect of this the time-spaces in which Schemata operate become associated. Association between Schemata, which by now may be disparately located, cross-modal, or inter-Schematic, is the precursor to the association and eventual synthesis of time-spaces. This homogenising tendency allows us to describe the collection of Schemata as belonging to some unified whole.

Though the infant may inhabit a single space-time, as long as the Schemata are still separate and organised around situated behaviours, then this space-time is contingent on activity, and is only generalised to the extent that whole body activity is general. The advance of general proprioceptive awareness in the second half of the year helps to concrete this unitary nature. Piaget (1955) calls this "Subjective space and time". Subjective Space-time is properly not described as Egocentric. Egocentricity implies a structuring or prioritising of data with regard primarily to a Self. There is no evidence that a Self has developed at this stage. Subjectivity implies

that the structuring and prioritising of data is primarily due to properties of the subject - the organism as a whole - rather than of the object(s) with which it deals (i.e. the physical world itself).

The internalisation of Subjective Space-time is constantly reproduced by the communication between Schemata that increasingly occurs. Subjective Space-time can be thought of as a network (an intranet?) in which each Schemata has an address (actually a cluster of addresses). We return to the general implications of this mode of cognitive organisation; first we examine the particular case of vocal behaviour.

2.4.7 Early vocal behaviour.

It is during the second half of the first year that vocal behaviour begins to take on some of the properties of speech. Vocal behaviour evident even in the neonate seems to embody two separate functions - the social and the biological. Individual tokens of vocal behaviour may increasingly show different mixtures of these functions but it is important to show that the two root causes are quite specific. Only by doing this can we really determine the contributions of society and biology to cognitive development.

In the neonatal period all vocal behaviour is reflexive and/or vegetative. That is, the behaviour is (i) a vocal component of some reflexive expression of affect - for example crying or 'fussing' noises or; (ii) an 'accidental' feature of some action involved in eating or respiration - for example burp, swallow, spit, gasp noises[41]. Such behaviours are characterised as being biologically caused (i.e. embodying biological function) - shared in common with animals and having no social content.

Interestingly, Stark (1979) notes that "From 12 weeks of age, the frequency of crying drops markedly and in most infants primitive vegetative sounds begin to disappear" (p26), implying that later socially oriented or induced behaviour replaces those more biologically based, rather than merely supplementing them. Biologically based behaviours may thus lose their very identity through this replacement - not only do biologically based vocal behaviours disappear, but most of the neonate's innate behavioural vocabulary in general is quite short lived. Normal adults do not

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41 Phonological descriptions will not concern us greatly here, apart from broad trends of development: for example increasing complexity of the signal, or approximation to the PC language. See Stark (1979) for details.

communicate happiness by giggling, for example (it is significant in itself that an adult will more often communicate than express an affective state).

Stark notes cooing and laughter behaviours making an appearance a little later (cooing first noted after around 8 weeks, laughter around 16 weeks). These 'comfort' sounds are located in "comfortable states usually in response to smiling and talking on the part of the mother" (p24). Trevarthen's article published at the same time (1979) claims that "Neonates coo weekly [sic], often when alone. When coos become clear and strong in the second month, adults find them pleasing" (p325). These are two interpretations of the same observation: namely that a number of weak vocal articulations become more pronounced and coherent in the third month of life. However, their implicative forces are quite different, embodying different assumptions about development in general.

Stark's article concentrates on the phonetic changes in vocal behaviour, social and biological forces of changes are kept distinct in her exposition and she seems primarily concerned with the latter - the stress is on measurement of physical changes in the vocal tract. The above quote is one of only three references to social 'moments' in the child's vocal development (also p29, 30 on babble in imitation and play). Her focus on describing innovations in vocal behaviour and her technique of explaining these innovations as facilitated by material innovations in the vocal tract allows an implicitly constant function of Piagetian Motor Restlessness to drive the change. This effectively avoids requirements of intention on the part of the infant. This focus also allows Stark to avoid having to build functional vocabularies of the child's behaviours at different stages of development, and speculating as to how these stages relate.

In contrast, there is a strand in Trevarthen's work which seems to conflate social and biological moments, with a tendency to look for proto-forms of later behaviour in that of the infant or neo-nate - and ultimately to postulate their innateness (in the sense of being present at birth, or in the stronger sense of being "formed before birth" (1979: 326)).

When cooing is weak it is an indistinct part of the neonate's vocal motor restlessness and receives associations, confirmation, whatever, only as part of this biological, animal program. When cooing is part of the Play Area it becomes functionally different: it is possible that cooing noises are innately correlated with internal states of satisfaction but now they express this state to others - they are externalisations. This is not yet communication, it is an external correlate of an internal state of affairs. The behaviour then becomes part of the Social Environment, largely through the intervention of Caregivers, and the forces which act upon the *coo* Schema

are different: earlier biological regularities give way to confirmations and associations from the Social Environment.

More social motivation of vocal behaviour begins during the period of coherent Subjective Space-time. This period, during which the infant begins to explore the objective world (the initial period of distal time-spaces is one of internal cohesion), is also a period in which play with the Caregiver is more oriented toward objects. During this second four months contact between infant and Caregiver is mediated by objects - the physical environment of the child is being enlarged. Just as important, contact between the infant and objects is mediated by the caregiver: already nature is being mediated by society, and exploration of the new physical environment takes place within the commentary space of the Play Area.

Vocal behaviour up to around 9 months consists largely of vocal play and 'babble'. These two behaviours correspond to (a) vocal play: an exploration, via motor restlessness, of the growing vocal apparatus, concentrating on variety and shorter utterances; and (b) babble: imitation of the apparent ubiquity of speech sounds. These babble utterances tend to be longer but less rich; examples might be /@d@d@/[42], /adada/. Phonological details need not concern us, other than to point out that there is a general trend toward the production of salient sound patterns of the Social Environment.

Vocal behaviour, especially babble, is fast becoming a constant accompaniment to activity. Babble is present even when the infant is engrossed in solitary activity, suggesting that a tripartite association may be developing between Speech, Society and (Directed) Activity. However, there is no evidence that Speech is yet communicative or referential, or even cognised as a separate behaviour (other than in the motor restlessness of vocal play). Communicative intent and reference is importantly imposed by the Caregiver. Vocal behaviour is still part of the concrete internalisation of situated behaviour that is the Schema.

2.4.8 The Vocable.

While vocal behaviour is not intentionally meaningful in itself at this stage in the child's development (up to the end of the first year), neither is it entirely homogeneous or random in its application. Sounds are experienced as part of the

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42 '@' should be taken to represent the Schwa vowel.

child's environments and tend to be associated with the situations with which they appear most regularly. Through internalisation sounds become a part of certain Schemata - though there is no reason why one sound should not be in more than one Schema or why one Schema should not contain more than one sound. The sounds internalised will be those heard or produced with regularity, but not necessarily with intention. Non-human sounds may be internalised, especially at early stages. The sounds are not likely to be phonologically accurate at this point: as child behaviour suggests (e.g. Stark 1986) - the child only gradually moves toward the sounds specific to the Social Environment from a vague exploration of its vocal capacities. But as always with internalisation, it is strongest for the most salient sounds of a situation.

Biological or animal motivation, from the physical environment, is present at birth and comes in the form of vocal components of innate behaviours, for example affective expressions, or of 'accidental' sonorant effects of other behaviours. Gasps and burps associated with eating are an example. 'Imitation' in the sense defined above may also occur, so that the infant may produce as well as appreciate many sounds. Sounds associated with play and other such situations will be internalised in the same manner. Naturally occurring sound and socially produced sound (i.e. language) are both at this stage internalised in the same way. That is, the association internalised is that of a physical regularity - between occurrence of a sound and of some physical state of affairs.

Motivation from the Social Environment begins slightly later, around two to three months, when the child is beginning to move around away from the mother and the Play Area gets a little more complicated. The greater involvement of language in these games (on the part of the Caregiver) is only a quantitative step from earlier experience, which placed speech with other sounds in the physical environment. However, this period also often sees speech begin to act under the Commentary function of the Social Environment.

Initial developments of this kind are Trevarthen's "Protoconversation" (e.g. Trevarthen 1987: 186f and citations therein), which consist of purely musical exchanges encapsulating the idea of turn-taking in dialogue or in a game. "The mother's speech takes the form of short (500-700 msec.) one- to three- syllable utterances, with clear, rather breathy voicing and marked intonation. It appears as if she uses falling-rising (U-shaped) prosody to invite infant response, and falling tone to acknowledge or 'sympathise with' an infant utterance" (p187). Consciously or not, the Caregiver (Trevarthen's "mother") is helping the child to identify two types of behaviour by associating them with distinct vocal sequences. Although the child is

apparently taking part in a question and answer dialogue, there is no semantic content to the infant's utterances and there is no linguistic communication. The child is however beginning to internalise and imitate behaviours present in the Social Environment.

A further important step from around three months is the Caregiver's practice of singing nursery rhymes and lullabies to the child. If one can historicise away from the very Eurocentric and 'happy nuclear family' image of nursery rhymes, these games show a very particular function which is mirrored by similar games in various cultures (see Jahoda & Lewis 1986). The situation generally consists of highly differentiated language, focusing on very little activity. "Mother's songs are typically made up of simple verses, usually of four lines, lasting 10-15 seconds. They follow a beat interval centred on moderato and ranging from about 750 msec (andante) to about 450 msec (allegro). Lines of the song have regular changes of pitch that raise and lower the expectation of a listener/actor. The ending may be a dramatic climax with mock aggressive or mock surprise tone" (Trevarthen 1987: 189). An example is the iambic tetrameter in Figure 2.12.

Figure 2.12: The iambic tetrameter.

.	Round	and	round	the	gar-	.	-den,
.	like	a	a te-	-ddy	bear.	.	
.	one	.	step	.	two	.	step,
a	tick-	-ly	un-	-der	there	.	!

The highly emphasised rhythm and music of the language, and especially the fact that language itself is often the focus of activity, as in the nursery rhymes, brings speech further into the Commentary space of the Social Environment. Speech is being highlighted as an important feature of activity, and as an activity important and playable in itself.

It is in this period, and after, that vocal play begins in earnest. Vocal clusters produced from 16 to 30 weeks (Stark 1979, 1986) are longer, more complex (i.e. composed of more segments) and of more varied articulation than previous biologically based utterances. It is interesting that, as this socially motivated vocal play develops, vegetative sounds like crying, gasps and burps begin to disappear. The

implication is that the phonetic properties of these utterances drifts towards the phonetic properties highlighted, or 'licensed', by the Social Environment: and so the child's phonological vocabulary begins to drift toward that of its native culture (see also Carter 1979: 89f).

As Subjective Space-time coheres in the period after 4 months, the associations between sounds and situations become more particular: specific situations will develop specific vocal associations. But while the child's cognition is Schematic, vocal behaviour is contingent on activation of Schemata; in other words, Schemata begin to show vocal properties. Vocal properties of some Schemata may be internalisations from the neo-natal period: for instance, developments from vegetative sounds. Others may be 'taken' from the Social Environment in the sense that those vocal clusters which are regular contributions to a situation on the part of an interlocutor may tend to associate with the Schema more strongly than with the speaker. In this case they will be internalised as a property of the Schema (rather than of the speaker). Thenceforth, the sounds may occur as a response to the presence of the Schema, as an indicator, or as a stimulus for activation of the Schema.

That these vocal clusters are 'taken' rather than 'given' emphasises that, although the source of these vocalisations may be the Social Environment, the particular sounds internalised by the child can be quite idiosyncratically chosen. In other words, the fragment of sound selected and internalised by the child, although a regular property of the Schema, may not be the fragment of sound considered by the adult interlocutor to be most apt to the situation. This is merely a special case of the child's general process of subjective and concrete internalisation. The adult and the child inhabit fundamentally different phenomenological worlds: the adult may perceive an objective situation, the child is inside a subjective Schema. Thus a vocal string of some specificity may become a component of a subjective Schema. Henceforth I'll use the term Vocable to refer to these vocal components of Schemata (after Werner & Kaplan 1963, Carter 1979).

Vocables show more stability and regularity (in terms of correlation with a situational context) than babble, but don't yet show any explicit communicative intention (Carter 1979, Dore et al. 1976). Carter's diary study (of a child named David) identifies 8 Vocable Schemata each located around a consonantal focus: in Figure 2.13 (Carter's Table 1) certain segments are strongly associated with certain types of behaviour.

Figure 2.13: Simplified description of David's eight communicative Schemata in the period 12 to 16 months[43].

	Schema	Gesture	Sound	Goal	No. of instances (1st 4 play sessions)
1	Request Object	reach to object	[m]-initial	Get receiver's help to obtain object	342
2	Attention to Object	point, hold out	alveolar-dental ([l] or [d])-initial	Draw receiver's attention to object	334
3	Attention to Self	sound of vocalisation	Phonetic variants of *David*, *Mommy*	Draw receiver's attention to self	142
4	Request Transfer	reach to person	[h]-initial (constricted and minimally aspirated)	Obtain object from, or give to, receiver	135
5	Dislike	prolonged, falling intonation	nasalised, especially [n]-initial	Get receiver's help in changing situation	82

43 See also Carter (1978b).

6	Disappearance	waving hands, slapping	[b]-initial	Get receiver's help in removing object	32
7	Rejection	negative headshake	[?@?@]	Same as for Dislike (above)	20
8	Pleasure-Surprise-Recognition	(smile)	flowing or breathy [h]-sounds, especially *hi*, *ha*, *oh*, *ah*	Express pleasure	20

In the case, for example, of the [m]-based cluster, an 'anticipation of feeding' based Vocable (p90) has been generalised to associate with Schemata falling under the rubric 'Request Object' (RO). This generalisation is not a process of abstraction from individual elements, but is a process of 'concretion' isomorphic with the process of Schema building. An important element of the RO Vocable's construction may be an association of Schemata sharing a functionally similar 'anticipation of desired object' component (or something similar). This association is reinforced by the presence of related features of reach gestures and [m]-based vocal clusters. In the first stage of association, Schemata with any of these features will be associated (the more strongly the more features); in the second stage of concretion, associated Schemata will begin to assume new features more central to the RO Vocable. Carter notes "a definitive correspondence ... exerted by the sound of an adult word over its initial functional correspondence (upon incorporation of an imitative fragment of this word)" (p86-7). So accidental features of a situation (the sound of a word) are still being used to internalise that situation (in the sense of place it within a cluster of Schemata).

An important development here is the appearance of superordinate structures (i.e. the Vocables) 'above' the individual subjective Schemata. These superordinate structures are actually associations of features attributed to the individual Schemata; but their association tends to concrete them together and to dissociate the cluster

somewhat from the Schema. This occurs in much the same way as Localities associated, cohered and dissociated from reflexes (see 2.4.6 above). This particular example of Vocables shows the beginnings of the dissociation of language, but the process is quite general.

2.4.9 Play.

Perhaps a more decisive influence on the dissociation of Schemata is the child's experience of play in this period. The important functions of play have been pointed out at several points (2.4.5, 2.4.8). Towards year end, hide-seek games encourage the child's developing sense of permanency (Piaget 1955).

Initially the neo-nate shows no expectancy of object permanence, for example there are no attempts to search for disappeared objects. At first, removal of an object (e.g. a teat which the child had been sucking) results in the child repeating its 'part' in the situation (e.g. repeating sucking actions). This could most simply be interpreted as an effort to recover the situation by reactivating the Schema, with the expectation that the rest of the Schema should also be reactivated (see 2.4.3 on the atomic nature of reflexes and early Schemata). There is no comprehension that the infant's behaviour must interact with external objects. If the situation is not recovered and the Schema cannot be reactivated, anxiety ensues, but there are no more complex or externally aware attempts at recovery.

Later (2 months) a child will stare at the place an object was last seen, the place it disappeared from, again in 'expectation' of its return; and when the child becomes more mobile it can crawl over and examine the location. This latter step is the first instance of procedures similar to those of the search and, indeed, search procedures will tend to develop as an association grows between certain explorative behaviours and recovery of Schema. Search develops before a consciousness of the search, just as attention developed before intention. This step toward the search is tentative and rather fragile - contingent on success - and it is by no means certain that search behaviour proper, let alone an idea of the permanence of objects, will develop if the child is left alone to discover it for itself. The Social Environment is very important here.

Hide-seek games, in the socially licensed Play Area, provide a simplified and highly regular environment in which to find out about and develop one's own ideas of object permanence. The Caregiver makes sure that the child's attention has been

secured, that the disappearance of the object is clearly announced, and that its recovery (by either the child or the Caregiver) is highly salient - and occurs before the child has lost interest. The idea enforced is that the permanence of objects is something very regular, and something of which to be conscious. As powerfully as the appearance of Vocable Schemata (2.4.8), this consciousness may begin the decomposition of the subjective Schema.

2.4.10 Complexes.

Although the Subjective Space-time which has developed is strongly coherent, the Schemata within it are transient and are almost immediately being decomposed from two directions.

Firstly: each time a Schema is played, it will be appreciated slightly differently - adding information and making the internalisation yet more concrete. This enrichment of the Schema's internal structure will tend to create foci of concretion which will mirror certain objective qualities of the child's experience. The commentary of the Social Environment reinforces this tendency, and guides it in a socially licensed direction. Focus of attention on certain objects, events and relations during play, and especially during the establishment of permanence, promote examination and investigation of the object itself. For example, the figure of a toy played with in give/take games may begin to attain a measure of identity within the Schema. It seems plausible that properties of the toy will tend to associate more strongly with other of its own properties than with other properties of the play situation. This tendency will be enhanced by the activity of the Social Environment, which will generally label instances of functionally similar items with the same word. This the Socially licensed word becomes an anchor around which internalisations can cohere.

Secondly: Schemata competing for attention will associate if this conflict is regular. For example, this may involve similar Localities being stimulated and drawing the Schemata into conflict (see 2.4.6 & the emergence of a coherent whole-body locality). As the first wave of concretion progresses, this conflict will tend to involve Schema-internal foci of concretion more often than other internal portions of Schemata. The foci of concretion within each conflicting Schema are beginning to associate together. For example, figures of a toy in different Schemata may 'remind' the infant of one another, as *toy* events may stimulate several Schemata. In the same

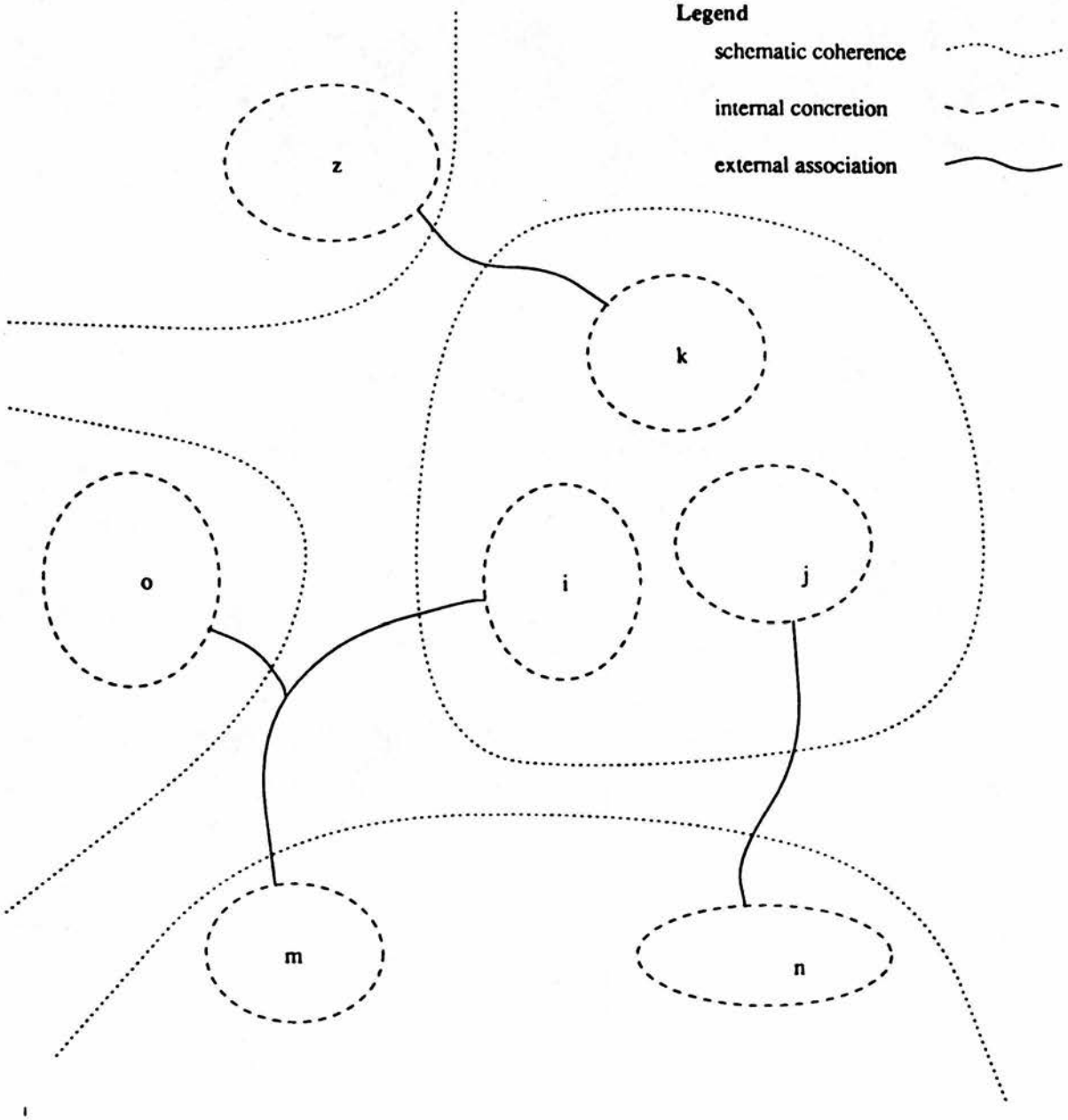
way figures of Caregiver(s) begin to cohere. These new agglomerations are termed Complexes after Vygotsky (1986).

These processes are illustrated diagramatically in Figure 2.14 below (from Uemlianin 1994).

The first wave of concretion allows the second, and by around 9 months of age associations between Schema-internal foci are strong enough to challenge the integrity of the Schemata. The organisation of cognition around situated behaviour is beginning to cohabit with an incipient organisation around independently existing Complexes. However, the decomposition of Schemata seems to be piecemeal, contingent on particular experience (i.e. there is not a switch between logical forms), and Complexive cognition can by no means replace Schematic cognition immediately.

This period, from around 9 months to year end is noted as one of special anxiety in the developmental psychology literature. Particularly interesting is the return to a reliance on the Primary Caregiver's function as a sensitising stimulus. "Psychoanalysts (Klein, Mahler) note a separation of the infant's more individuated self from the mother, which brings a risk of anxious depression or a fear of isolation. There begins a 'fierce' attachment to the mother, good attachments leading to confident learning about the world (Spitz, Bowlby, Ainsworth)" (Trevarthen 1987: 193). For the moment I'll take this growth of a sense of separation from the Caregiver as a development in the child's Complexive cognition, rather than a development of a sense of self especially, as Trevarthen does. One can imagine that the Primary Caregiver(s) presence would be a very early focus of concretion inside Schemata, and one which would associate with similar foci in many Schemata, providing a rich and clear Complex. Again, the 'Self' may be a special case of Complexive cognition. We'll return to it below.

Figure 2.14: Decomposition of Schemata.



The Complex[44].

Complexes of associated elements, which 'precipitate out' from the collection of Schemata in Subjective Space-time, dominate the child's cognitive behaviour for the next period, including that of the acquisition of lexical items and early grammar. Unlike the Schema, the Complex is independent of situation and in this sense approaches the Notions of adult language (see 2.3). However, it must be stressed that Complexes are pre-linguistic and are thus guided by the Social Environment to a much lesser degree. The content of the Complex is subjectively and concretely assembled, and this has significant consequences for its domain of extension.

Complexes will tend to internalise the most salient components of the child's experience. These components will be those most encountered in many situations; they will often be the most 'objective' or external to the child (i.e. easy to investigate); possibly the most 'socialised' (i.e. labelled as interesting by the caregiver(s)).

The Syncretic nature of the Complex's construction is a move away from the more immediate and concrete mode of construction of the Schema. The move from an organisation based on properties of the child's own behaviour towards one based around properties of some salient feature in the environment - however subjectively appreciated - is a move toward more objective thought. An example from Vygotsky (1986) may help illustrate. Vygotsky's famous block experiments were an attempt to show aspects of the child's thinking, and their development, in a concentrated form; as an accompaniment to naturalistic study.

The subject[45] is shown a collection of wooden blocks of different sizes, shapes and colours. Each is labelled on the underside with a nonsense syllable - for example *lag* on large and tall blocks; *cev* on small flat ones. The subject is given a wooden block from the pile, is shown and read the name, and is asked to collect together the blocks which are of the same type. After the subject has done so, they are shown and read the name of one of the 'wrongly' selected blocks and asked to continue trying (*op. cit.* p103f).

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44 It is not entirely clear, from a reading of Vygotsky (1986), what relation Vygotskyan Complexes are intended to bear to the emotional Complexes of Sigmund Freud, and in this thesis no relation shall be assumed. Although Vygotsky's work is apparently purely cognitive, Piaget and Freud are strongly associated in his critical chapters (pp12-58). A Marxist critique of Freudian psychology, developing the theoretical foundations of Vygotsky and Voloshinov (1927) would be an ideal sister study to the present work.

45 "More than three hundred" subjects were examined, including "children, adolescents and adults, including some with pathological disturbances of intellectual and linguistic activities" (Vygotsky 1986: 195).

The experiment, though quite simple, models several different stages of the child's response - "the initial attack on the problem; the handling of the sample; response to correction; and finding the solution" - all of which can be studied with some clarity of definition. The Social Environment is also represented in the gradual introduction of clues. Vygotsky and his associates found that the ways young children brought together sets of blocks reflected Schematic and (in slightly more developed children) Complexive ways of thinking.

The Schematic methods of the younger children focus on properties of the activity of collecting the objects. Selection may be apparently at random, or perhaps based on "the spatial position of the experimental objects, i.e., by a purely Syncretic organisation of the child's visual field ... or [on] their being brought into some other more complex relation by the child's immediate perception" (p111). After a transitional period, when the child chooses items based on elements included in groups already formed in the above manner, selection moves more solidly onto a basis on properties of the objects themselves, i.e., into Complexive thinking.

Early Complexes "may be based on any bond the child notices between the sample object and some other blocks ... the child may add one block to the nuclear object because it is of the same colour, another because it is similar to the nucleus in shape or in size, or in any other attribute that happens to strike him. Any bond between the nucleus and another object suffices to make the child include that object in the group ... The bond between the nucleus and the other object need not be a common trait, such as the same colour or shape; a similarity, a contrast, or proximity in space may also establish the bond" (p113-4). At the early stage of these 'Associative' Complexes new objects are merely reminiscences of the nucleus, more recent additions making no impact on its content[46]. This is not an abstraction of certain

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46 'Nucleus' here should be taken to mean prior in a simply historical sense. In fact, 'prior' or 'primary' may be a better term.

The English translation of Vygotsky (1986), by Eugenia Hanfmann and Gertrude Vakar in 1962, has been criticised for its oversimplification and loss of subtlety of Vygotsky's ideas. Hanfmann & Vakar intended to produce a more compact work than the Russian original, retaining Vygotsky's actual proposals, but editing out much of the complexity of his argumentation and losing his relationship with the cultural problems of the day. As Phillips (1986) puts it, "adjustments and contractions by the translators have undoubtedly made for a more direct approach; but they have, at the same time, prevented the reader from following the true - and sometimes deviating - trend of Vygotsky's thought" (p32).

For example, the Russian title "Myshljenie i rech' " is more accurately translated as "Thinking and speech" and reflects the concern with activity in Vygotsky's work. The more passive "Thought and Language" is a translation of "Mysl' i jazyk", the title of an earlier work by Potjebnja (Potjebnja 1913) with which Vygotsky had been in debate.

properties from a set, however: 'tokens' of the Complex may be reminiscent of the nucleus in any way. Neither is it an abstraction over time - the child is comparing each new experience with the original highly salient example. The child is still close enough to Schematic thinking that the manner of appreciation of an object (e.g. naming by the Social Environment versus discovery for itself) can affect its salience and thus the degree to which it is remembered beyond the particular encounter.

More developed Complexive thinking allows the reminding tokens themselves to have an imprint on the Complex, as each object encountered becomes as salient as the nuclear object. This is a further move toward the object, away from the child's own activity. In the example of a 'Chain' Complex (p116): " ... if the experimental sample is a yellow triangle, the child might pick out a few triangular blocks until his attention is caught by the blue colour of a block he has just added; he switches to collecting blue blocks of any shape - angular, circular, semicircular. This in turn is sufficient to change the criterion again; oblivious of colour the child begins to choose rounded blocks. The decisive attribute keeps changing during the entire process. There is no consistency in the type of bonds or in the manner in which a link in the chain is joined with the one that precedes and the one that follows it. The original sample has no central significance. Each link, once included in a chain Complex, is as important as the first and may become the magnet for a series of other objects."

These experiments abstract away from the child's natural activity and its Social Environment, but it is clear that the child's mode of thinking is drifting towards a kind of taxonomy of independent items. Before the child begins to use language to accompany its thinking it is difficult to locate any of these items other than the kinds of object Complexes identified in experiments like those above; for example, Complexes which may internalise relations between objects or types of event.

Complexes may bear a superficial resemblance to the Family Resemblances of Wittgenstein (1953: §66-72) and Vygotsky (1934/1986) addresses this similarity in passing (p105). The essential difference seems to be that Wittgenstein's Family Resemblances are a critique of pseudo-concepts as they exist in society, as objects of contemplation. Keenan's universal definition of Subject (2.2) is of this type, where elements of an already existing group of objects are examined for their inter-relations. The similarities between family members are objective and accessible to verification.

Vygotsky's Complexes are in the first place describing different objects - not pseudo-concepts which have a social existence but Complexes which are unique in the mind of the child (or the unsocialised adult). Thus the links between members are not objective and socially accessible, but subjective and contingent on the child's

individual experience, analysis of which is not always socially accessible. Finally Vygotsky's stress is on construction of the Complex rather than reference to it, and the associations between elements are the motor of Complexive growth.

Of course there may be an isomorphism, and one may be tempted to reduce the difference to one of scale - Family Resemblances being Complexes on the scale of an unconsciously developing culture. Vygotsky briefly discusses how Complexive thinking may relate to language change (p130-133).

2.4.11 Towards holophrastic speech.

The child's Vocables (2.4.8) are profoundly affected by this shift from Schematic to Complexive cognition. As noted above Vocables were vague congeries of sound attracted around a nucleus of an initial consonant (see Fig. 2.13 above). These Vocables would accompany some situation or activity more in a sense of being a feature of that situation than a conscious effort to communicate by the child. For instance, they are a vocal corollary of the reach gesture before it becomes a point: it starts in the child as a simple feature of the situation; it is understood by the Caregivers as an indication and thenceforth treated as a sign of that situation; the child will later internalise this special effect of the gesture (i.e. it's own reach can become the reach of the Social Environment).

So, the Caregivers impute significance to these Vocables. The effect of this, in general terms, is that outlined in 2.4.9 and 10 above, of a concentration in that area of the Schema, the formation of a focus of association and the beginning of definition independent of the Schema. Sound will decompose from Schemata in the same way as other features of Schemata are doing during this period (around year end).

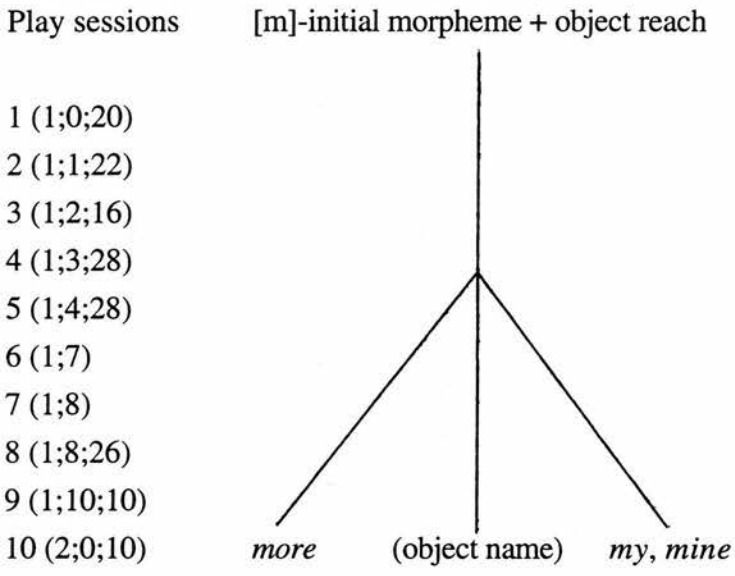
The special thing about the dissociation of sound from the Schema is that its dissociation is of a secondary order. Whereas objects, Caregiver and so on are items in their own right, sound is generally associated by the Social Environment with some other feature of the situation - either a transaction between child and Caregiver, an object of play, something the child or the caregiver is doing, etc. So, Vocables do not become Complexes of their own, they become features of other Complexes.

Two examples from Carter (1979) show this happening. In Figure 2.15 below (after Carter's figs 1 & 2) David's Vocables graduate from being a vocal component of gesture to a number of more varied communicative signals at the 'final' stage of 2 years and 10 days. The Attention to Object Schema (Fig. 2.15b) begins with the

alveolar-initial morpheme accompanying a reaching or pointing gesture. During the intervening year the concretion of subtly different situations, clarified by commentary from the Social Environment, has generated vocal corollaries for attracting attention to immediate, proximal and distal objects.

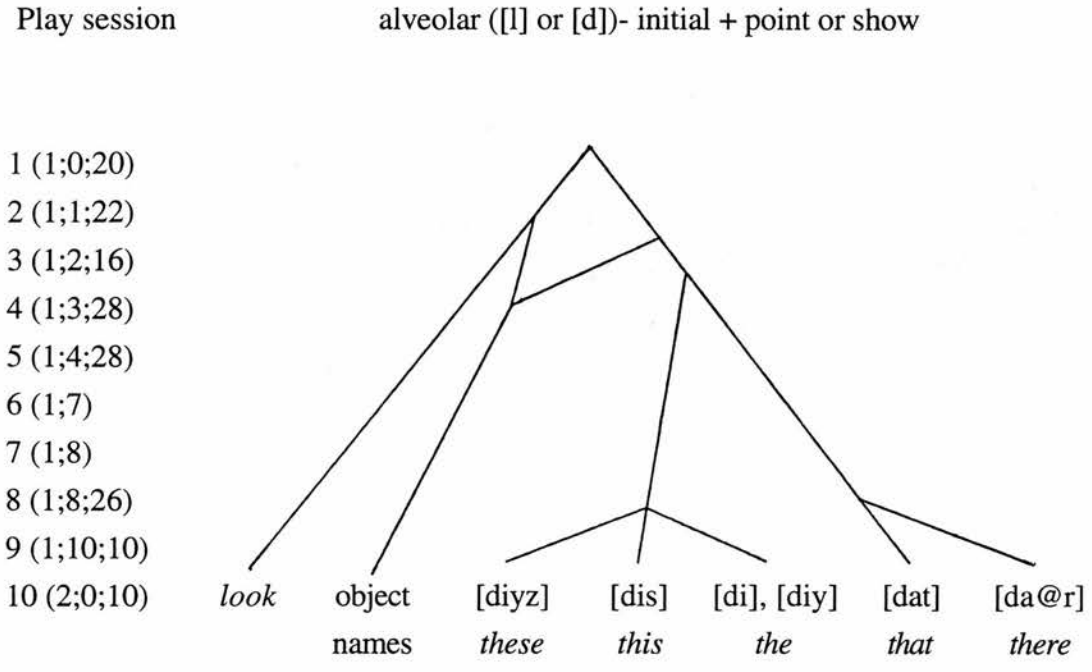
Figure 2.15: Development of Vocables.

(a): Verbal developments in the Request Object Schema[47].



47 See also Carter (1975).

(b): Verbal developments in the Attention to Object Schema[48].



Imitation plays a part here, and although the imitation is still very much on the child's terms, the Social Environment has much more power than before to determine exactly which associations are made. The subject-oriented Vocables of Figure 2.13 are based largely on earlier reflexive and effort sounds. The process of Schematic concretion, however, is based on the sound properties of actual situations, which are often provided by the Social Environment. This early contribution of the Social Environment is limited in the sense that salience is very much attracted by initial consonant (and other phonetic factors are rather poorly noted) and relevance to the Schema.

As the child moves over to more object oriented Complexive cognition its sounds associate more strongly with specific items or events within situations. Primarily this means that the contribution of the Social Environment has a much more focused effect. The variety of phonetic inputs associated with, for instance a toy doll, will be much more limited than those inputs associated with the whole situation of 'Attention to Object'; this variety is also more likely to be systematic and easily internalised - *doll*, *dolly*, *baby* i.e. a small set of synonyms.

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48 See also Carter (1978a).

So a Complex has sound, and this sound is the connection that Complex has with the Social Environment, and the abstract concepts there (see 2.3).The sound, the Vocable component, is the route of translation, or mediation, between the child's cognitive world and that of the Social Environment.

The child's early speech consists of single word or 'holophrastic' utterances (see 2.2.1.1, p46, n20). The use of these 'Complex morphemes' begins from around 12 months and into the second year.

Holophrastic utterances tend to vocalise the most salient Complex involved in the situation at hand. Holophrases may be vying for attention in the same way that Schemata were in competition in Subjective Space-time - the most stimulated being activated at the expense of the others. Alternatively, Complexes may still be bound loosely into Schematic patterns until fully object-oriented cognition is strong enough to take over completely.

In either case the child's utterances vocalise events or items with which the child is most intimately occupied. The following example (Figure 2.16) shows Allison Bloom characterising the situation(s) she is involved in with some Complexive versions of the adult prepositions *down* and *up*. More examples of her and others' verbal behaviours is examined in 2.5 and Ch. 3.

Figure 2.16: Allison Bloom *up* and *down*.

```
%act: <1w> picking doll up
*ALI: baby.
                                    *MOT: oh, where's the baby?
*ALI: up.
%act: <1w> picks up doll, bouncing it
*ALI: up.
%act: <1w> picks up doll, bouncing it
*ALI: up.
%act: <1w> picks up doll, bouncing it
*ALI: up.
%act: <1w> picks up doll, bouncing it
*ALI: down.
%act: <1w> puts doll down
```

*MOT: down.
*ALI: uhoh wideh@c.
%act: doll falls; pulling doll up
*MOT: want the baby to sit up?
*MOT: is that what you want?
*ALI: **up**.
*ALI: uhoh.
%sit: <1w> doll falls
*MOT: uhoh.
*ALI: **down**.
*MOT: down.
*ALI: **up**.
*ALI: **up**.
*ALI: **up**.
*ALI: **up**.
*MOT: is Baby happy?
*ALI: **down**.
%act: <bef> pushes doll on floor
*MOT: uhoh.
*ALI: **up**.
%par: grunting
%act: <1w> gets off chair; trying to get on it
*ALI: **up**.
%act: <1w> gets off chair; trying to get on it

2.5 Syncretic complexes in speech.

2.5.1 Examples of Complexes in speech.

When the child begins to use speech to express its thinking and feeling, the nature of its thought becomes more accessible to study. Although the child is learning to see items as existing independently of situations, and is in this sense becoming more objective, the child's language reveals that the same subjective and syncretic processes, described above in Vygotsky's block experiments, are still the dominant mode of thought for the child.

The examples below (Figs 2.17, 2.18, 2.19; citations from Clark 1979 and Vygotsky 1986) are chronologically ordered lists of the observed referents (or apparent stimuli) of particular utterances of a single Complexive 'word'. These Complex names are apparently being used by the children involved to label instances of a Complex. There is in embryo the naming function of later speech - the instance is being labelled for the benefit of an interlocutor. To avoid confusion with later forms of speech, these initial labels will henceforth be described simply as part of the Complex to which they attatch. In the first example (Fig. 2.17: the Complex "Mooi"), the roundness and frosty glow of the moon seems to have been taken as the feature to which other potential tokens of the Complex are compared - rather like the Association Complexes outlined above (2.4.10).

Clark (1979), from which the example is taken, takes this as an example of 'overextension', meaning that "the child's meaning may overlap with the adult's but extend beyond the adult category named by the word in one or more directions" (p151). Although apparently quite adequate, this definition seems to lack some subtlety. Clark compares the adult and child words as if they are words of different languages, with slightly different meanings but conceptually of the same type. Complexes and concepts are very different however (see 2.3) and crucial here is the lack of abstraction in the Complex.

Figure 2.17: Mooi.

the moon;
a cake;
round marks made by blowing on a cold window pane;
writing on windows,
    and in books;
round shapes in books;
tooling on leather book covers;
round postmarks on letters;
the letter O;
...

"Mooi" could plausibly be taken as meaning 'Round thing' in child language, in the same manner as adult words have some particular extension. In this case "Mooi" would be a simple 'overextension' of "moon". However, there appears to be a kind of extensional 'drift': the third use of the Complex ("round marks ...") seems to license the inclusion of various curly shapes in the extension of the Complex. Richer examples of Complexive speech show more subtle activity in the child's mind and reveal the Complex as far more a network of associations than is the adult word.

For the first set of utterances in the example below (Fig.2.18), one could interpret "Quah" as having extension over bodies of liquid, and thus again showing the stable extension of adult concepts. That the child is referring back to the concrete nuclear situation is revealed in the second set of utterances, where the figure of a bird attracts a new token into the complex ("a coin with an eagle on it"). This addition is evidently a highly salient one as it shifts the extension of the Complex away from liquids and toward "round coinlike objects". Thus the Complex forms a primitive Chain.

Figure 2.18: Quah.

a **duck** swimming in a *pond*;
any *liquid*;
the *milk* in his bottle;

a coin with an **eagle** on it;
any round coinlike object;
...

A more developed Chain Complex is shown in Fig. 2.19 ("Bow-wow") below. The first two referents seem to have few features in common and perhaps had some unrecorded contextual association for the child. As use of the Complex proceeds, the properties of *miniature*, **furry**, and noisy seem to be the most salient attractors to the complex. But once the ***shiny*** glass eyes on the fur piece form a salient association (on day 331) into the Complex, this too becomes a potential attractor.

Figure 2.19: Bow-wow.

day

251 a china *figurine* of a girl;
307 a **dog** barking in the yard;
the *pictures* of his grandparents;
a *toy* **dog**;
a clock;
331 a **fur** piece with an animal's head
(with glass ***eyes***);
a **fur** stole without a head;
334 a rubber *doll* that squeaks when pressed;
396 his father's ***cufflinks***;
433 pearl ***buttons***
on a dress;
a bath thermometer;
...

These real life examples bear a formal resemblance to the kinds of structure portrayed in the block experiments above (2.4.10). Complexes are concrete agglomerations of experiences, as with Schemata, and their composition is by factual association rather than by the *a priori* abstract definition of the formal concept. As we can see, this lack of abstraction of 'definitive' features from the salience of concrete experience allows the extension of the Complex to drift almost aimlessly. The development of abstract thinking in the child requires the intervention of the Social Environment.

There are motives driving the child toward abstract thinking coming from both the Physical and the Social Environments; and here the Social Environment is the more significant. This follows the general trend during the child's life from birth, for the Social Environment to gain in significance, overshadowing the significance of the Physical Environment.

A tendency toward abstraction may be an effect of the accumulating concretion inside the complex, much as repeated use of a schema led to foci of association which became a little abstracted from the rest of the schema. As the Complex is used over an extended period, it is possible that certain features become strengthened a great deal more than others, allowing the latter to become part of a 'background'. The analogy with neural behaviours of sensitisation (see 2.4.1 above) is implicit and the mechanics of the processes may be similar: associations of features which are regularly repeated - especially in recent memory - will increase in salience for the child; features which are less regularly associated will decrease in salience, may fade in the memory, and more saliently associate with some other Complex. This process, like sensitisation, reflects objective tendencies in the physical world - accidental properties of objects will occur less regularly with those objects as a type.

Notably the strength of the influence of the physical environment depends on its regularity. In this regard one must consider the objective nature of social mediation of (or commentary on) the physical environment. A culture which technologically manufactures many of its artefacts will provide a much more regular physical environment for its young than a culture whose artefacts are contingent on what is at hand. The more technological artefacts are, as it were, the concrete realisations of pre-existing abstract concepts. Thus a designed and manufactured knife is already nearer to the abstract concept of *knife* than is an appropriated and adjusted natural object like the jawbone of an ass or a sharpened bit of rock.

These objective tendencies are perceived subjectively, however, and there is no guarantee that a subjective internalisation of objective regularities will generate conceptual structures isomorphic to those of the Social Environment; and even in the most advanced societies, the physical environment is only limitedly regular. The more significant role is played by the active and vocal Commentary of the Social Environment concentrated around the child.

There is firstly the role of regularly giving names to objects, events, etc. The most obvious effect of this is to strongly associate a sound with a specific group of objects. We have seen that this effect can initially be somewhat unpredictable, in that the child is free to interpret the reference of (the salient part of) the caregiver's utterance in its own way. While the child's cognition is schematic, this interpretation will associate sounds with schemata (2.4.8 & .11 above); as cognition becomes dominated by Complexes it is these Complexes which hold associations with particular, if still vague, sounds. The Complex, although it may not refer (see 2.4.11 on holophrastic speech: the tendency to name the most salient component of the present situation), might label collections of objects, relations or properties, even if this collection is done in a fundamentally different manner to that of the concept. The repeated association of certain of the elements of a Complex and a certain sound becomes one of the most salient associations in that Complex. The role of the Social Environment as a source of heightened regularity can be seen as an abstracting Commentary on the physical environment. The Social Environment also has a more interventionist role.

Correction by adults can play a large part in influencing the child's meanings. Chapman et al. (1986) describes a longitudinal study of four mother-child dyads in play, sessions starting when the child is around 1;1 and finishing around 1;7. It notes the occasions of inappropriate word use and what kinds of response the caregiver made. At the end of the study, the authors were able to note how many of the children's words in production were still "over-extended" and how many had drifted towards the adult extension; the children's comprehension was tested in the same way, for whether the child's comprehension of certain terms had drifted toward or away from the adult extension.

Caregiver responses were categorised into 'acceptance' when the child's inapropriate use was not challenged; 'correction with joint labelling' for example, "that's not a car, it's a truck"; and 'correction with explanation' where the correct word is used along with some kind of demonstration, for example, "It's a truck - see you can put things in it." The results are shown below in Figure 2.20.

Figure 2.20.

(a) effects on comprehension.

%	regression	unimproved	improved
Acc	*29*	29	*43*
CJL	20	20	60
CwExp	*07*	21	*71*
Mean[49]	19	23	58

(b) effects on production.

%	still "over-extended"	change without improvement	improved
Acc	*64*	21	*14*
CJL	40	27	33
CwExp	*36*	21	*43*
Mean	47	23	30

The results appear highly significant ($p<=0.01$) but their interpretation is not entirely immediate. The values of the mean indicate that there are also some background developments irrespective of the caregivers' corrective tactics: specifically there is a tendency for improved comprehension, while the children's own production is somewhat more stubbornly "over-extended". The fact that "improvement" is slightly more likely than "change without improvement" may testify to the attractive power of the Social Environment as a motive for change, although this difference may not be statistically significant. Laid over this general trend it appears that a lack of corrective tactic ("Acceptance") fosters stagnant or even regressive word usage; "Correction with

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49 Significant deviantions from the mean ($p<0.001$) are italicised.

Explanation" acts quite effectively as an attract to the Social Environment; while "Correction with joint labelling" is, perhaps surprisingly, rather neutral in developmental terms.

The most startling differences are: (a) those reflecting the efficacy of 'Correction with Explanation' for advancing a child's understanding - there is virtually no regression of comprehension when the difference between objects is demonstrated to the child. This same tendency is evident in changes in the children's production, where 'correction with explanation' provides the greatest attraction towards adult concepts and away from Complexive word use; and (b) those reflecting the effect of a lack of any correction (i.e. of any intervention by the Social Environment) on the development on the child's production - if the caregiver accepts inappropriate words, almost 2/3 of the children's production at 1;7 is still strongly Complexive.

The importance of the Social Environment is clear, and the importance of a certain kind of Commentary which simplifies concepts beyond the child's comprehension (e.g. abstraction) and relates them to the child's practical experience ("No, it's a truck. Let's load it up."). These are the functions of play (see give/take, hide/seek in 2.4.5, 2.4.9 above): this Commentary activity is essentially the same as earlier play, but its action is focussed on the child's inchoate linguistic ability.

2.5.2 The Locative.

By around 16 months of age, the child will have a small vocabulary of words which bear a strong resemblance in sound to adult words, and though their extension is Complexive, their use bears enough resemblance to that of adult words to be adequate for a great deal of dialogue. As well as objects, relations and events are being treated in this Complexive way. Certain features of this are most readily seen examining the presence in holophrastic speech of what appear to be imitations of adult prepositions.

The earliest group of prepositions attested in productive vocabularies tend to be those naming the basic spatial relations: *up*, *down*; *on*, *off*; *in*, *out*; and so on (Tomasello 1987). These are present in holophrastic speech and through much of early combinatorial speech they retain their primitive meaning.

Prepositions expressing more abstract relations like *with*, *for*, *by*, and so on, are not generally attested until slightly later, and are used with much less confidence

(Tomasello p89). These relations remain unexpressed and in early combinatorial speech the child is more likely to name the participants in such a relation, omitting the preposition. For example "Coffee Weezer" and "French-fries Grover" (Tomasello) and "Pour Mommy Juice" (Bloom 1973, Uemlianin 1992) all accompany the child speaker's actions of giving or pouring something for a recipient.

There are both general cognitive and specifically linguistic reasons for this lag in acquisition. Linguistically, the more abstract prepositions tend to be much less stressed, belonging more prototypically to 'functional categories', and consequently less salient to the child. However, the cognitive hypothesis - that these prepositions express concepts more difficult for the child and are thus more problematic acquisitions - should not be overlooked. Tomasello (1987) puts forward two arguments against this hypothesis.

Firstly, "It is not obvious, for example, that for the child sweeping 'with' a broom, or giving something 'to' someone involve more complex or abstract concepts than placing an object 'on' a table or 'in' a cup" (p80, re-iterated on p90).

Secondly, "during the period when the spatial prepositions were first being used prepositionally, all of the later-learned prepositions designating non-spatial relations were being omitted from appropriate sentences. These omissions would seem to indicate that non-spatial concepts were in some sense available to T[ravis, the child under study] as early as those designated by the spatial oppositions. Indeed, studies of early two word sentences invariably find attempts to express instrumental, dative, comitative, and genitive relations at the same developmental period as attempts to express locatives (Brown 1973)." (p90).

To respond to the second argument first, the implication seems to be that the child is omitting precisely the correct prepositions from the correct utterances - instrumental prepositions from utterances apparently expressing an instrumental relation, and so on - as if the child knew the concepts already, but simply didn't know the word, or the name of the concept. This is a startling claim in itself, related to Chomsky's nativist arguments (see 1.3 above), but there is also an implicit step of interpretation of the child's actions in claiming that the child is "attempt[ing] to express instrumental, [... etc ...] relations".

This is the interpretation of a Caregiver, not a linguist. With reach gestures a non-communicative action is treated as significant by the Caregiver and thus becomes significant for the child. In utterances like "Coffee Weezer" the child is expressing only a vague, unidentified, correlation of objects perceived together in the same situation. This expressed correlation, appreciated together with the non-linguistic

context, is interpreted by the Caregiver as some specific relation which has been licensed by the Social Environment (i.e. by the language). That children use utterances with 'omitted prepositions' is an expression of the fact that the child has appreciated that the named items are related in some way. The fact that this relation is not expressed at all - beyond the concrete relation of their co-occurence - is evidence that the relation has not been fully internalised[50].

With this in mind, let's turn to Tomasello's first argument, on the plausibility that the relations expressed by some Prepositions are more complex (in the everyday sense) than those expressed by others. In the concrete sense of involving more entities in inter-relation with each other, some prepositions are obviously more complex than others. Prepositions, in a similar way to verbs, have an argument structure which may involve two (the cup on the saucer) or more (the dog between the cat and the mouse) objects. Furthermore, as well as the many prepositions representing relations in space or time, there are prepositions which incorporate senses of agency or volition (e.g. dative and benefactive prepositions - under Tomasello's definitions (p82)). In many languages possession can be represented prepositionally. Concepts of agency and ownership are highly abstract, presupposing an understanding of specific psychological and social relationships (i.e. that of a 'self' with its actions; that of a person with certain objects and properties).

So some prepositional relations may be more complex than others both in the sense of being more concrete (having more to them) and of being more abstract (further removed from subjective experience). In this case, the 'cognitive hypothesis' deserves some consideration.

It is necessary in this case to look more closely to the child's actual use of these Complexive 'Locatives'. This term may be leading, but it is important to substitute the term 'Locative' for the adult word 'preposition' as this latter is misleading in two senses.

Firstly, it implies there is already some common element of meaning in the adult concept and the child's complex, other than the formal similarity of their sharing the same name (e.g. "up"). This homonymity is presumably significant, but this significance is not necessarily that of identity. It is more likely that there is some difference in the child and adult terms comparable in some way to that between the child and adult notions of 'moon' above. Secondly, the term 'preposition' explicitly defines the word only as it appears in linguistic relation to other words. 'Adposition'

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50 There will be a fuller discussion of how the separate ideas in multi-word utterances relate in 2.5.4 and Ch. 3).

is the same in this regard. In much early speech words apparently imitative of adult prepositions are produced holophrastically.

The term 'Locative' is not intended to imply that the child's terms express only locative relations (i.e. relations of proximity in space-time), although that is not entirely contrary to what is being claimed. Complexive Locatives seem to be expressing the dissociation of relation or event from the Schema; i.e., the relational part of a Schema is being given a name.

One thing that Tomasello (1987) notes only in passing, is that "most of the earliest uses [of child prepositions] were verb-like, that is, they were used to request or comment on an ACTIVITY not to indicate [a] spatial relationship" (p83). Having noted this and the problem it causes - whether a particular utterance is being used as a preposition or as "a verb particle as a verb" - and distinguished the uses, the issue is dropped. For Tomasello (1987) the problem is merely one of linguistic interpretation and there is no consideration of what this subtle shift in meaning may represent.

Tomasello's 1992 study of a child's acquisition of verbs shows little improvement on this. Here verbs seem initially to be defined informally as 'any non-nominal' (p9-10) and then as "any word that the child uses to predicate a process of something" (p11); and there are two types of "verb-event concepts: change of state and change of action" (p13). This defines verb away from the depiction of an action or an event as a state-of-affairs, as in stative verbs or progressive aspect in adult language. The state-of-affairs depiction of an event can associate together features of verbs, prepositions and adjectives - which all in a sense predicate over arguments. And it can characterise the apparent stimulus for utterances like Allison Bloom's in Fig. 2.16 above.

Interestingly, not only do early Locatives express 'Verb-like' relations, but as is either un-noticed or left implicit in Tomasello's work, they appear significantly before (imitations of adult) Verbs in the child's production, and have a remarkably different function to these early 'verbs' (see 2.2.1.1, p47 for notational conventions).

In the speech of Allison Bloom 'verbs' are only beginning to make an appearance at 1(year);4(months);21(days), when Locatives seem to be already quite established. In a sample of 466 utterances (virtually all holophrastic), 86 were Locatives and only 25 were verbal. The most common Locatives were "up" (48 utterances - more than 10% of the total!), "down" (25), "away" (10) and "here" (1): these were without exception used as an accompaniment to the child's own action. Of the 25 'verbs' only 3 accompanied action in the way of either the Locatives or of adult

verbs: the majority (22) of these utterances - "stop (2), "gone" (20) - are completion markers, announcing the termination of an action, for example finishing a glass of juice or a cookie. Not till the third taped play session, at 1;8;21, does Allison begin to use 'verbs' in their adult sense, and Locatives continue in their accompaniment sense till the fourth session (at 1;8;21). This transition is accompanied by a shift in the frequency of use of verbal and Locative utterances (see Figure 2.21 - in the fifth (2;4;7) and sixth (2;10;0) files sentences had become the dominant form of utterance (about half of the total) and purely Locative or verbal utterances were consequently rarer).

Figure 2.21: Allison's Locative and Verbal utterances.

sample file	Locative	Verbal
1 (1;4;21)	86	3(+22 comp.)
2 (1;7;14)	66	8
3 (1;8;21)	42	62
4 (1;10;0)	10	75
5 (2;4;7)	21	52
6 (2;10;0)	14	59

2.5.3 Event structure and the Self in holophrastic speech.

If these Locatives are Complexes, what significant features might they have? A complex is an association of foci within various schemata: foci which because of their strengthening external associations, begin to dissociate from their original schemata and coalesce into a new grouping a little independent of the schema and the other components therein.

This independence implies that the Locative is not a relational term at all, but is an object name in the same way that "mooi" and "quah" are object names, identifying an item in perception. The Locative is a name for a state-of-affairs: bearing in mind (from 2.4c) the problem of describing these Complexes as having a fixed extension,

Allison's Locative "up" (Fig. 2.16) can only be paraphrased as 'there's some "upping" (going on) around here.' The Item 'upping', from Allison's own utterances might be herself climbing onto a chair, or trying to stand a toy doll up, mummy lifting her up, and so on..

These Locative Complexes are not quite as vaguely Syncretic as pre-linguistic Complexes, as they attract predominantly states-of-affairs which are associated with a particular name by the Social Environment. However, this abstract base is interpreted by the child in a concrete way, such that, for example, the Locative "up" may express any of a group of relationships or events.

Child utterances which involve some imitation of adult verbs are acquired in use slightly later (see Fig. 2.21 above). They also seem to incorporate from the beginning, some relation of the speaker with the Item named. The vast majority of early 'verbs' are completion markers, accompanying the termination of an event. Later it is exclusively 'verbs' which accompany the child's expressions of desire for some Item.

'Verbs' in the child's speech (only occurring with any consistency at (Allison's) 1;8;21) tend to accompany more specific sets of relation/events. For example, here are some of the utterances accompanying events that may earlier have been accompanied by "down": "sit", "sit down", "lie down", "tumble", "rest" and "pat".

This difference in use is obviously not *because* the two sets are 'prepositions' and 'verbs'. On the other hand, the assertion that the difference is simply driven by attraction to the Social Environment is not entirely convincing. Perhaps it is significant that 'verbs' make their appearance around the same time as the child is making two word utterances (see 2.5.4 below).

During holophrastic speech it seems that cognition is still very much schematically organised, and Complexes are only gradually dissociating. The Complex vocalised in a particular situation will be the one most salient, most stimulated by what's going on. This may be some object in play, or in the distance, or it may be some other activity in which the child is involved.

This raises the question of the child's own sense of selfhood and agency during this period. Around year end the child first responds specifically to its own name, which for all intents and purposes includes "baby" (Trevarthen 1987, Griffiths 1986 citing Leopold's (1939) diary study). Allison does 'name' herself, but very rarely, and generally using the term "baby". Self-naming occurs twice at 1;4;21

("baby"); 16 times at 1;7;14 ("baby" *15, "Allison" *1); and 24 times at 1;8;21 ("baby" * 11, "Allison" * 13), by which time two-word utterances are attaining some consistency (see Figure 2.22 below).

Figure 2.22: Allison Bloom's self-naming.

sample file	"baby"	"Allison"
1 (1;4;21)	2?	0
2 (1;7;14)	15	1
3 (1;8;21)	11	13

If our hypothesis is right, about vocalised Complexes expressing the most salient component of a situation, we would expect the above attested utterances to occur when it is the child's own effort which is causing most sensation, over and above any objects the child may be interacting with, or any particular activity in which the child may be involved.

Figure 2.23 shows the least ambiguous of Allison's uses of *baby* at 1;4;21 (taken using the CHILDES database, MacWhinney 1991). The first accompanies the child apparently getting an itchy nose (perhaps some bubble liquid got up there). The second is more ambiguous and may be a reference to the doll on the chair. However, the doll doesn't seem to be part of the situation, in which Allison is having trouble climbing up onto the chair.

Figure 2.23: Allison's *baby*.

1

```
*ALI: 0.
%act: puts fingers in bubble liquid on stick.
                    *MOT: uh.
*ALI: xxx.
                    *MOT: stop.
*ALI: there.
%act:     <bef> puts stick down and puts top on jar;
          <aft> takes top off jar.
                    *MOT: 0.
                    %act: stirs bubble liquid;
                          tries to make bubble.
*ALI: baby.
%act: rubbing her nose
                    *MOT: mm.
```

2

```
*ALI: climb.
%act: <1w> holds onto seat of chair,
pulling herself up
*ALI: up.
%act: <1w> holds onto seat of chair,
pulling herself up
                    *MOT: up?
```

```
*ALI: up.
%sit: <1w> doll is on chair
*ALI: baby.
%par: <aft> grunting
%act: <aft> struggling to get on
chair
                        *MOT: what?
*ALI: xxx.
%act: <1w> kneeling on chair
*ALI: chair.
```

The most salient component of these situations seems to be some bodily sensation in the child herself, and not necessarily a sensation of activity on the world, i.e. of 'agency'.

Vygotsky noted the tendency for more demanding experiments to prompt vocalisation in children, even when there were no caregivers present (1986, p28f). This is in his discussion of Piaget's concept of Egocentric speech and for Vygotsky speech at this point is not entirely social, being more often an accompaniment and later an aid to the child's own action. Certainly by no means the vast majority of Allison's utterances are explicitly directed at the interlocutor (her mother), who often seems a little extraneous to the action.

The decomposition of a Self from Subjective Space-time triggers a sea change in the organisation of the child's perception, breaking away finally from Schematic cognition. Initially the change is only quantitative: components of Schemata dissociate from their Schemata and are re-associated with each other, in the same manner as the object Complexes outlined above (2.4.11). This particular decomposition seems to be quite late - as we see above Allison Bloom is only beginning to name herself when she already has quite a large productive vocabulary. Neither is it in itself any different from other dissociations from Schemata - the Self becomes an item like any other.

But it is precisely this last that causes the change. Extrapolating from the (admittedly slim) evidence above, the Self Complex - vocalised as either the child's own name or some Socially licensed equivalent such as "baby" - is attracted around such things as bodily effort or physical sensation: stimuli occurring when the child's action on the world is more salient than the specific actions, relations or objects present.

This concretion is important as it creates a first specific impression of causality. In Subjective Space-time there was no causality as such, things just happened, that is situations were either present or not. Association between Schemata was not strong enough to provide causal or even chronological links. The same went for (material) objects, and the child's conception of object permanence was limited to within the Schema; the search limited to examining the location of disappearance (Piaget 1953, 1955). But as the Self is not yet a special object, this causality does not rest solely within it. The association between the child's own effort and a salient change in the world becomes a generalised chronological association between salient Complexes. The effect in cognition is the idea that one Complex 'causes' the presence of another Complex.

In a sense this mode of cognition is more 'objective' - in the sense that objects have causal relations without the intervention or presence of the child itself - and Piaget refers to this period (stages 5 and 6 in his developmental chronology) as constructing an objective space-time (Piaget 1955). Indeed, particularising the Self away from being some *eminence grise*, a world in which everything happens, is a step toward objectivity. However, although a Self is being identified, the child's perspective on the world is still exclusively its own: Space-time is no longer Subjective (i.e. a feature of the organism) but is still Egocentric (i.e. reflecting certain features of the individual's perspective).

An example of this egocentrism is the world-view of many children, sometimes expressed when older, but still showing an egocentric perspective on space-time and causality. Piaget cites experiments revealing an 'optical realism' where the child "substitutes for the physical relations of bodies the visual relations corresponding to the apparent data of perception" (1955: 358). Later (p 377-8) Piaget notes an "animism" in the child which endows objects with selves much like the child's own, such that the movements and effects of inanimate objects are anthropomorphised. Older children who can communicate their ideas in language speak of the human rationality behind these anthropomorphised objects - houses are there to live in, rain to make the grass grow, mountains to climb, and so on. Primitive societies often seem to have a similar world-view - chariots pulling the Sun across the sky, the wind 'blowing' clouds, gods hurling thunderbolts at mortals.

The most significant points for our present purpose in this whole movement are that, in the wake of the Self's dissociation from Schemata: (a) Complexes are able to become more separately defined, gaining in permanence and integrity; (b) these Complexes come to be salient in their own right, and thus have a claim on the attention

in their own right, rather than as a part of a situation; (c) 'things happening' is now no longer a property of Schemata, or situations, but one of Complexes, and situations will now tend to be built up of Complexes rather than vice-versa; (d) the Self Complex is the most salient Complex associated with 'things happening'.

2.5.4 The beginnings of combinatorial speech.

The psycho-linguistic literature attests that the child's holophrastic and 'single-word' vocabulary grows steadily to a size of about 45-50 words in production before combinatorial speech begins with any regularity. Three to four times this many words may be understood by the child but are not familiar enough to be confidently produced (Papers in Fletcher & Garman 1979, 1986). Some authors describe a slow initial growth in vocabulary followed by a "spurt" in growth after a dozen or so words have been acquired (e.g. Garman 1979, Peters 1986). This is apparently interesting and may relate to some sudden realisation of linguistic significance, but many studies attest to a steady and gradual acquisition (e.g. Griffiths 1986) and there is a great deal of cultural and individual variation in rates and even 'routes'[51] of development. Wells (1986: 117) cites a large corpus wherein "at 42 months ... the difference between the most and least advanced children was equivalent to 30 to 36 months" of development. The "vocabulary spurt" is of insufficient generality to necessitate maturational explanations (Radford 1990: 275).

A productive vocabulary of about 45-50 words is characterised in the literature as having been reached by around 18 months. This is the kind of figure reached by tacit consensus between researchers rather than between first language learners and although it serves to 'place' the child's development in our imagination, it is the kind of figure which can shift from being a tag of convenience, to being an 'average' to being a majority case. Once these figures are so solidly defined they become interesting phenomena requiring explanation in themselves (e.g. Radford 1990: p21, reproduced below as Figure 2.24, and the maturational explanation, p272f.). 'Stages' are hard to get away from, however, precisely because they break up the concrete and irregular flow of development up into easily digested thematic units. One of the difficulties reading Vygotsky is that he generally avoids the use of stages, criticising it as replacing causality with chronology (1986: 40). Although this thesis has tended to

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51 In the sense of what kinds of words or phrases are acquired in what order - expressive or referential words, nominals or phrases, etc.

do the same it has been necessary to acknowledge the existence of developmental stages - in the literature - in order to draw on the research of other psychologists. Predominant in this regard so far have been Piaget's developmental stages treating the child's pre-linguistic cognitive development. The final part of the thesis, on the establishment of linguistic behaviour proper, will have critical reference to the kind of consensus language acquisition chronology as formalised in Radford (1990).

Figure 2.24: a language acquisition chronology.

stage	**age (months)**	**name**	**example**
i	0-12	pre-linguistic	*oogh*
ii	-18	single-word	*apple*
iii	-24	early multi-word ("Early Child English")	*Jane want apple.*
iv	-30	later multi-word ("Late Child English")	*I want to have an apple.*

Whatever the child's individual pace or direction of growth through this "vocabulary spurt", once a child is using 30 words or so on a regular basis, there is some movement toward multi-word utterances. The gap between holophrastic and combinatorial speech is bridged by a combination of attraction by the Social Environment and the child's own developing Complexive cognition of the world. The bridging phenomena seem to fall into three broad categories, which will be outlined here, and which we'll call 'Phonological Extension', 'Juxtaposition' and 'Rote Memorisation' (Garman 1979, Peters 1986). As usual, different children may stress each tactic differently: all three are present in Allison Bloom's transitional speech.

Phonological Extension is akin to babbling, an imitation of the immediately perceptible properties of adult language. Much of Allison's early speech (at 1;4;21) either comprised or contained babble: for examples, "ehwideh@c ehwideh@c", "uh uh no no wideh@c"; "mama wideh@c", "more wideh@c" and "eh@c baby"[52]. Many of the utterances consisting entirely of babble are quite long

52 'wideh@c' and 'ehwideh@c' seem to be generic markings for babble-type utterances in the Bloom database on CHILDES.

and seem to express Allison's appreciation of the longer prosodies of adult speech. Babble utterances incorporating intelligible words can be interpreted as expressing the same appreciation. Several studies (summarised in Garman 1979: 186) interpret the babble which co-occurs with adult words as a kind of 'pre-syntactic device', units like 'wide' or 'eh@c' above being 'dummy forms' or 'placeholders' for the syntax to come. Whatever they come before, Phonological Extension itself does not express an advance in the child's understanding of the Physical or Social Environments, other than a gradual realisation that there is *something* different about the adults' longer utterances.

Rote Memorisations show essentially the same imitative process by which the child learns its reference words during single word speech and by which it develops Phonological Extension. Here, the child's growing comprehensive and productive abilities allow imitation of larger units. These imitations are again not a conceptual advance and show the Complexive properties of use of other holophrases. For example, "gone" or "allgone" (Allison Bloom's most common 'verbal' utterances at 1;4;21) tend to be used as Completion Markers, but they also appear to express surprise, as with Allison's "gone" exclamations at bubbles suddenly bursting. Also, a study (DeLemos 1981) of Latin American children shows how they 'appropriate' the perfective tense marker as an independently usable Completion Marker. This is identical to Allison's use of "gone" and is not necessarily equivalent to acquisition of anything like tense or aspect.

When the child starts to use such constructions as "allgone" or "oh dear" they are unanalysed units and not yet structures with "positional constituency of elements but no productivity" (Garman 1979). In production, the child may seem to have some grasp of constituency, producing structures like "all gone", "all clean", "all done" and so on. However, in a much cited empirical survey (Braine 1976) all such examples were repetitions of adult expressions and weren't productive in themselves, i.e. each new "all + X" phrase had to be learned individually. Before the child can be productive with combinatorial speech, or even use it at all, it must occur to the child that more than one thing can be said of a single situation.

The third bridging phenomenon, **Juxtaposition**, occurs where more than one (generally not more than two) words are uttered "within a unitary context and [are] interpretable as converging on a single topic in that context" (Garman 1979: 184). These are the first linguistic expression of a real advance in cognition. A holophrase can either be interpreted as the 'name' of a schema, or the name of the most salient

Complex within the stimulated schema. The most conservative interpretation of Juxtapositions (within our model) is that a stimulated schema is providing enough stimulation for more than one Complex within it; a more advanced interpretation may be that Complexes are being directly stimulated by the environment and, in occasions that stimulate a Juxtaposition, the environment itself contains more than one salient object. The child certainly has more than one thing to say about a particular situation. In early Juxtapositions the constituent words are separated by a pauses and have separate intonation contours; with more familiarity of use, pauses diminish and a united intonation contour can develop (Peters 1986). The child's familiarity with longer prosodic units through Phonological Extension is obviously apposite to this latter development. Some examples from Allison Bloom's early speech (at 1;4;21) may illustrate:

Figure 2.25: Some of Allison's Juxtapositions (at 1;4;21).

(a)

```
*ALI: xxx.
*ALI: chair.
*ALI: down.
%act: <1w> trying to get off
chair.
```

(b)

```
*ALI: xxx.
*ALI: xxx.
*ALI: climb.
%act: <1w> holds onto seat of
chair, pulling herself up.

*ALI: up.
%act: <1w> holds onto seat of
chair, pulling herself up.
```

(c)

```
*ALI: cookie.
%act: <1u-3u> looking around
for cookies.

*ALI: cookie.
*ALI: no.
*ALI: cookie.
*ALI: no.
*ALI: ehwideh@c.
*ALI: no.
```

(d)

```
*ALI: baby.
%act: <1w> looks around at
empty table; glances at doll
on floor; looks around; then
going back to doll.

*ALI: up.
%act: <1w> picks doll up;
walks to little chair with
doll, pretending to cry.
```

These juxtapositions are notable in several ways. Firstly, the juxtapositions do not necessarily reflect relations specifically licensed by the Social Environment. Studies generally try to taxonomise the relations expressed into 'entity + location', 'agent + action' (Peters 1986: 317) and so on, but the usefulness of this taxonomy is limited when its composite 'Participant Roles' do not seem to come from some definite, limited set (see Dowty 1989). The relations which seem to be expressed are

of such variety that they can be defined best by the property that they are both immediately salient to the child in that concrete situation.

Secondly, it seems that, in Allison's case at least, Complexes are being stimulated directly rather than through the mediation of a Schema. The fourth example above is taken from towards the end of the session and yet it appears to display features of slightly more primitive cognition in terms of juxtaposing holophrases - the holophrases are separated by activity, they appear in slightly different situations. Allison's language does become more primitive towards the end of the session; she seems to tire, being uncomfortable with the set-up (cameras, lights, ...); and her behaviour becomes a little fractious - she is often "pretending to cry" in the second half of the sessions.

On noticing the doll Allison utters the holophrastic "baby"; still with the doll in the foreground (after looking away and coming back) it occurs to her to go over to it and pick it up; then she utters the holophrastic "up": this at least is the order of apparent events. The Complexes "baby" and "up" are associated in hindsight, as it were. It is not implausible that mere utterance of a Complex reinforces that Complex and makes it more salient in the child's attention: children are attracted by vocal comment by the Social Environment and imitate corrections (see above 2.5.1); they talk to themselves when puzzling over or physically challenged by a situation (see above 2.5.3); a search can be accompanied by repetition of the name of the objective (see Figure 2.25c) above). In fact, it is apparent from the child's behaviour in these cases that the name can have precisely the function of holding or clarifying the Complex in attention. This is a very important development as it indicates the possibility of the separation of the name of a Complex from the Complex itself: instead of being a feature of the actual presence of a Complex, the name is becoming an indication that the Complex is present either actually or in attention.

This change enables others which are worth mentioning. Unfortunately there is not the space to discuss them at length. Speech remains, for the time being, Egocentric in Piaget's (1926) sense. But from this period on two functions of speech which are increasingly differentiated first become evident. Vygotsky (1986: 224-235) characterises this differentiation as a process of socialisation: on one hand the increasing internalisation of the Social Environment by the child, and on the other hand the child's increasing externalisation of its own attitudes (in a form acceptable to the Social Environment).

On the one hand there is Egocentric speech, which is directed inwards for the child's own benefit, as an aid to attention and planning (e.g. Figure 2.25 (c) and

possibly (d)). This eventually disappears and is apparently internalised completely to become a mode of thought (not the whole of thought). On the other hand there now begins a mode of speech which is specifically targeted at someone else, either to involve an interlocutor or to express the child's own desires, and which is constantly reinforced by the Social Environment to become everyday external speech. Although before this stage all of these functions are apparent on occasion, while speech is a property of situations Egocentric and socially directed functions of speech cannot properly be said to exist at all.

To return to the phenomena bridging holophrastic and combinatorial speech, it seems the interplay of the three tactics allows productive combinatorial speech to develop, where the child's expression of its inner attitudes meets its imitation of the Social Environment. As the child becomes fluent with its Juxtapositions, their prosodic outlines will begin to assimilate with those of the babble-filled Phonological Extensions. There will also be cases where a single 'word' appears in the child's vocabulary both as a holophrase, and thence as part of a Juxtaposition, and independently as part of a rote memorisation - for example, Allison's "more" can appear holophrastically or as part of a phrase: "more cookie", "more wideh@c". The realisation that such imitations of the Social Environment are in effect Juxtapositions reinforces the productivity of the child's own combinations.

3
The paralysis of syncretism and the development of 'Subject' in later child language.

" ... or to isolate i from my multiple Mes on
the spits of Lumbage Island ..."

(Joyce 1939: 410.12-13).

3 The paralysis of syncretism and the development of 'Subject' in later child language.

3.1 "Early Child English".

3.1.1 The stabilisation of child language under social pressure.

As the child vocabulary grows, its meanings become more specific and tend toward the socially licensed meanings. Growth in the size of the child's vocabulary in itself may seem to encourage a specialisation of the extension of each particular Complex. Especially if we assume that the child is, in some unconscious habitual way perhaps, avoiding such sense relations as superordination, synonymy, hyponymy and so on. This is plausibly the case, and studies have observed not only that "in the period up to 1;6, the only sense relation in children's vocabularies appears to be *incompatibility*: 'if something is an *X* then it is not a *Y* or a *Z* or any of the other terms in the set of incompatibles'" (Griffiths (1986: 305), citing Griffiths (1976) and Barret (1978), (1982) in support), but also that this singular sense relation is maintained by a continuing sensitivity to newly formed (and verbally labelled) Complexes: i.e. that "[a] particular 'overextension' of a nominal in production usually ceases as soon as the child's production repertoire includes what adults would deem to be a more appropriate word" (Griffiths (1986: 301), citing Anglin (1977: Ch.. 4), Barret *op. cit.*, Rescorla (1981) in support).

This latter observation helps pinpoint the role of the Social Environment in the growth of the child's vocabulary. Changes in Complexive extensions tend to be in line with what adults *do* deem more appropriate; only much later when the child has internalised some of the authority and attitudes of the Social Environment does the child begin to define itself against what adults *would* deem to be more appropriate. Both Piaget and Vygotsky relate this later internalisation to formal schooling. They also relate it to the beginning of formal thought, that is thinking in terms of concepts rather than Complexes. Conceptual thought requires the internalisation of some authoritative voice, an abstract definition, which is unassailed by concrete experience. Thought is conceptual to the extent that the thinker's own experience is subjugated to these authoritative abstractions. As pointed out in 2.3 everyday thought is rarely

Conceptual in this strong sense, and abstract definitions are apparently only a concrete feature in the Complexive pseudo-concepts.

Vygotsky (1986) uses the term 'pseudo-concept' to express the fact that these things act for most intents and purposes as if they were concepts. This seems to be the case for the child's language at this point (as speech is becoming consistently combinatorial), and increasingly we can talk of the child's Complexes as words and as meaning the same things and in the same way as the adults' words. It is most apparent with the most concrete object and activity names, later with more abstract words like "more", which in Allison Bloom's early recordings has a cluster of uses related more or less indirectly to the adult meaning.

Another feature of the child's speech being drawn inexorably toward that of the Social Environment is the elementary word order of its utterances. In the first Juxtapositions (2.5.4) there is no constancy of ordering and Complexes are apparently vocalised in the order they make their salience felt. Similarly the Rote Memorisations of adult stock phrases are imitated unanalysed and are utterances with no word order from the child's perspective.

Figure 3.1 below shows all of Allison's multi-word utterances from the first three play sessions and the situation which prompted each one, i.e. the non-linguistic context. By the fourth she was speaking in the regular Early Child English stereotyped in Radford (1990), which is discussed in 3.2.

The earliest session shows already some constancy of word order in the 'more + X' utterances, long before 'more' is showing a stable extension as a quantifier. The notion that a child notices syntax before comprehending it (DeLemos 1981), or that a child internalises syntax before semantics (Vygotsky (1986), who talks about how grammar generally precedes logic (p220)), seems to be borne out by these 'more + X' utterances - Allison has accurately internalised the socially licensed word order but the semantic relation between the words seems only just to be stabilising.

The remaining utterance and the two from 'ali 2' provide not enough evidence in themselves to be particularly suggestive. Most immediately they suggest the semantic relations licensed by word order in the Social Environment, given a very loose reading of the terms Subject Verb Object. Given the non-linguistic context, on the other hand, they also suggest an ordering by salience. These two interpretations are not necessarily isomorphic - i.e. it is not necessarily the case that the 'actor' is the most salient component of situations, followed by the 'action', followed by the 'acted upon'. This is apparent from the fact that holophrastic utterances do not most often express 'actor' Complexes. Indeed if anything there is the opposite tendency -

Complexes relating to objects acted upon tend to be the most lexicalised, followed by 'actions' followed by the 'actor' (generally Allison herself). As there is no 'natural' relation between the ordering of Complexes in child language and word order in the Social Environment, one must assume that the former's attraction to the latter is imitative.

Figure 3.1: Allison Bloom's early two-word utterances.

session	**age**	**utterance**	**situation / interpretation**
ali 1	1;4;21	more baby	after playing with car, sees doll.
		more pig	pulling toy animals from bag.
		more cookie	pulling cookies from bag.
		more cow	putting toy cow on table/ looking for toy bull.
		car away	pushing the toy car around.
ali 2	1;7;14	down mommy	jumping down onto Mommy's lap.
		ba[by] down	during repeated efforts to sit down on the chair.
ali 3	1;8;21	baby Allison	compound: own name.
		baby doll	compound: doll.
		dirty diaper	'Adj. + N'
		lie down	accompaniment.
		sit down	request.
		more juice	reaching for more juice.
		mommy help	turning away from Mommy's help.
		"mommy you wiping" => mommy wiping[53]	request.
		baby cup	Locative: 'genitive'.
		buy store	Locative: 'at'.
		children rain	Locative: 'in'.

53 As this is the only pronoun attested before 'ali 5' (i.e. 2;4;7), I am assuming this instance was rather an articulatory product of the high-front vowel ending of 'mommy' running into the initial velar approximant of 'wiping'. I am treating the utterance as "mommy wiping".

mommy baby	Locative: 'genitive'.
mommy floor	Locative: 'towards'.
mommy juice	Locative: 'genitive'.
mommy shower	Locative: 'in'.
walk school	Locative: 'towards'.
coat on	Locative: putting coat on chair.
mike on	Locative: noticing mic on mommy.

By 'ali 3' Allison's utterances are more definitely reflecting the socially licensed word order. Many of these may be direct imitations: the compounds, "dirty diaper", "lie down" and "sit down" in particular are cliched enough in content and use to be so. The single **more** phrase is in keeping with social license both in its ordering and its use. The two non-Locative *mommy* phrases both mirror the salience ordering of before - in both situations both the mother and the activity described loomed rather large, in the first negatively (Allison did not want to take off her coat) in the second positively (mother and child sharing a joke).

What is most interesting about this set of utterances is the disjunction between the use of 'prepositions' and the expression of Locatives. Locatives are here expressed largely by the collocation of two Complexes. This is not a case of 'implicit' or 'omitted' prepositions, rather an expression of a vague unspecified relation of two elements. The Complexive nature of these elements is still apparent in the way that 'nouns' + 'nouns' can be related in the same way as are 'verbs' + 'nouns', i.e. words have not separated into distinct classes. It should be stressed that the 'expansions' of the Locatives are given with reference to the non-linguistic context and act merely as a guide to the variety of objective relations which are subsumed under the Complexive relation of Locativity. The 'expansions' are not 'translations' and they are not an indication of the child's mental processes.

Interestingly, the only two Locatives which are lexicalised may be evidence of a new development. Figure 3.2 below shows the full context of "coat on" and "mike on". In 'ali 3' and earlier sessions, the Complex "on" is invariably used as a 'verbal' Locative - sometimes stative, sometimes active - and here it seems to have a similar function. However, in each case, a pair of utterances seem to be approaching one another in the same way as did early Juxtapositions (2.5.4): in **1** "chair" and "coat on"; and in **2** "mommy" and "mike on" are being somewhat awkwardly associated.

Figure 3.2: explicit Locatives in 'ali 3'.

1

```
*ALI: chair.
%act: takes off coat; carrying coat to chair
*ALI: chair.
*ALI: xxx.
*ALI: chair.
                                    *MOT: big chair.
*ALI: coat on.
%act: <1w-2w> putting coat on chair
*ALI: chair.
%act: <1w> putting coat on chair
                                    *MOT: coat on chair.
                                    *MOT: oh, good girl.
                                    *MOT: good girl.
                                    *MOT: ok.
```

2

```
*ALI: mike.
%act: pointing to overhead microphone
                                    *MOT: microphone.
*ALI: Mommy.
%gpx: <1w> points to Mother's
microphone, comes over to Mother
*ALI: Mommy.
%gpx: <1w> points to Mother's
microphone, comes over to Mother
*ALI: mike on.
%gpx: <1w> pointing to Mother's microphone
                                    *MOT: Mommy microphone on,
                                         yes.
```

3.1.2 Word combinations.

The advance from two to three words is as significant as that from holophrases to two words. In holophrastic speech the situation is not consciously divided into components - holophrastic utterances comprise either the name of a Schema or the most salient Complex within it. Two word speech breaks down the situation into the two most salient Complexes, but these are related in an unspecified way: Verbs, Nouns and Prepositions are not distinct as classes of words, and what regular word order there is, is merely an Accommodation to the Social Environment. However, the only relation apparent in two word speech is that of precedence - there is evidence for no further grammatical structure. The before-after relation seems to be tied to salience and social licensing rather than to any specific relations between objects in the world. And it only seems to be able to relate two words.

The Juxtapositions we saw at the end of 3.1.1 are apparently challenging this limit, or at least expressing the limit as such. Figure 3.3 shows the types of Juxtaposition attested in 'ali 3'. There are occasionally intervening Caregiver utterances but these are generally prompting repetitions and add no new information to the dialogue. There are two important processes at work here. Firstly, the association of a pair of words together as a unit: 'dirty diaper', 'baby doll', 'lie down' have a cliched enough use in 'ali 3' to be almost treated as a single unit of meaning. In these Juxtapositions the relation between units is still primitive. In the second group of Juxtapositions there is an inchoate relation between three distinct units. As yet there seems to be no further meaning behind the orderings than immediate salience - a salience which is often a product of dialogue (i.e. social activity) rather than of physical activity. There is no impression of a systematic predication of units by a more foregrounded unit.

Figure 3.3: Juxtapositions in 'ali 3'.

"dirty ... away ... dirty diaper ... away"
"baby doll ... cookie"
"baby doll ... lie down"
"buy store ... pin"
"mommy floor ... down ... sit down"
"children rain ... walk ... rain"
"walk ... rain ... walk school"

In 'ali 4' much of Allison's speech is in Early Child English, but coexisting with this is a great deal of one and two word speech, and some slightly more advanced multi-word Juxtapositions (see Figure 3.4). Some of these Juxtapositions show a similar primitive relation of three items as in 'ali 3'. The first two in particular (respectively accompanying Allison wiping the chair, and Allison dumping cookies onto a diaper) do this. Most of these utterances however show an Accommodation to the socially licensed word order.

Figure 3.4: Juxtapositions in 'ali 4'.

"wiping ... Baby Allison ... chair"
"dump ... baby diaper"
"baby eat ... cookies"
"mommy open ... box"
"mommy ... skirt on"
"baby doll ... get toys"
"mommy ... comb hair"

The most important consideration at this point, however, is to go beyond the immediate word order and investigate the growing impression that there is some structure to the child's utterances, of predication. Especially as in 'ali 4' Allison is becoming fluent in Early Child English, which is described in Radford (1990) as having a primitive but specific Xbar structure. The increasing length of Allison's utterances is of only tangential relevance to this development: most significant is the early strength of two word Locatives. These early word collocations remain strong through later developments. Although particular collocations are reinforced or weakened by the Social Environment, the two word Locative as a type has been internalised as a singular unit of meaning. While an utterance consists of two units, each 'unit' may be a single word, a compound (e.g. "Baby Allison") or a Locative (e.g. "skirt on", "baby diaper", "mommy down", "baby eat"). This is still not predication, as there is no evidence of asymmetry between the two related elements, i.e. no objective basis on which to name one of the elements as the argument rather than the predicate. In other words, the child's utterance structure seems to be along the lines of Figure 3.5.

Figure 3.5: Utterance structure.

Utt	-->	A B	
A, B	-->	Locative	(two Complexes Schematically related)
		Compound	(two Complexes acting as single item name)
		Complex	(item name)

Much of Allison Bloom's speech at 1;10 ('ali 4') has this structure. This is a contradiction of Radford's (1990) Xbar analysis of Early Child English (supposedly extant around 1;6 - 2), and is approached by Deuchar's (e.g. 1993) flatter structures. However, Deuchar offers no evidence to support her interpretation of an utterance's internal relations as predicate-argument, "where the predicate can be seen as a proto-head, and the argument seen as a proto-specifier or proto-complement" (p8). The words which do predicate, e.g. "more", seem to be the exception rather than the rule, and to be particularly direct borrowings from the adult language: Locatives are a more general relation (in Allison Bloom's speech at least). Like Trevarthen's rich interpretations (2.4) and Tomasello's "omitted prepositions" (2.5), Deuchar's 'proto-Xbar' structure is an academic version of the creative interpretation characteristic of the Caregiver.

Xbar relations are specific meaningful relations between different parts of an utterance. They are more about how words relate to each other than how the words relate to the world. Although internalisation of socially licensed word ordering and word clustering is in progress, structures similar to Xbar only develop with the tendency for one particular unit of an utterance to be noticeably separable, or different, in some way from the rest of the utterance. Such a unit makes its first appearance in 'ali 4' (1;10;0), namely the explicit lexicalisation of the child herself as the actor in the stated situation.

3.1.3 The 'subject' in Early Child English.

Radford (1990) describes Early Child English as simply being Adult English without the Functional categories and the accompanying Xbar branches. The Xbar facility as a whole is fully intact, with its Specifier, Head and Complement relations, as are the Nominal, Verbal, Adjectival and Prepositional systems. This analysis elegantly captures much of the difference between child and adult language: the lack of Tense (no INFL system), Case (no Determiner system, through which sentence internal semantic relations are carried, in much post-Abney (1987) Government-Binding theory), Pronouns (ditto) and other similar syntactical properties. Early Child English (ECE) is said to have the structure given in Figure 3.6(i), with the following examples (ii-iv). In chapter 5 Radford draws attention to the similarity between such structures and non-finite adult 'small clauses' (e.g. Figure 3.6(v) - (vii)). Once the lack of case marking and so on has been dealt with, Radford goes on almost without comment to name the 'specifier' of ECE Small Clauses as the same 'subject' we find in adult English (Figure 3.6: (vii) & (viii) below).

Figure 3.6: syntactic structure in ECE.

(i)	$[_{X''}$ specifier	$[_{X'}$ adjunct	$[_{X'}$	$[_{X}$ head]	complement(s)]]].	(p78)
(ii)	$[_{V''}$ $[_{NP}$ Baby]	$[_{V'}$	$[_{V'}$	$[_{V}$ eat]	$[_{NP}$ cookies]]]].	(p72)
(iii)	$[_{P''}$ $[_{NP}$ Mouse]	$[_{P'}$	$[_{P'}$	$[_{P}$ in]	$[_{NP}$ window]]]].	(p74)
(iv)	$[_{A''}$ $[_{NP}$ Sausage]	$[_{A'}$ $[_{NP}$ bit]	$[_{A'}$	$[_{A}$ hot]	]]].	(p77)
(v)	I don't want [your feet on my table].					(p113)
(vi)	$[_{P''}$ $[_{DP}$ your feet]	$[_{P'}$	$[_{P'}$	$[_{P}$ on]	$[_{DP}$ my table]]]].	
(vii)	$[_{X''}$ $[_{DP}$ subject]	$[_{X'}$ adjunct	$[_{X'}$	$[_{X}$ head]	complement(s)]]].	(p113)
(viii)	$[_{X''}$ $[_{NP}$ subject]	$[_{X'}$ adjunct	$[_{X'}$	$[_{X}$ head]	complement(s)]]].	(p114)

It is only after this model has been well grounded in the reader that Radford introduces the fact that Small Clause Specifiers are often "omitted" from children's utterances (Ch 8, pp198-239). The effect of Radford's method of presentation is that "missing arguments" are treated as an exception to the rule, to be described by adjustment of the above basic structures. In fact only just over 10% of Allison Bloom's utterances ('ali 4' at 1;10;0) have an explicit Specifier. The majority of Allison's longer utterances would be better described as Verb Phrases (VPs) - with implicit Specifiers and often other arguments implicit also. It should be pointed out that even these VP utterances only constitute around 20% of the 1;10;0 corpus, most of which is still Complexive holophrastic or two-word speech. This situation emphasises the way different formal structures can coexist in Early Child English. By 'ali 5' (2;4;7) Allison is using the pronouns and Case marking indicative of 'Late Child English'.

In developing his position, Radford criticises Hyams' analysis of missing arguments as instances of the empty category [pro][54] (e.g. Hyams (1986), (1989): Radford also cites papers showing the development of Hyams' argument in between). Radford's argument draws on elements of Hyams' case work and specific features of [pro] which shall not concern us here (for example, its nature as a variable over DPs and thus not available in DP-less ECE). Most appositely, Radford notes that (a) there are missing arguments in 'objective' positions (pp. 213-218); (b) that there are utterances with more than one missing argument (pp. 220-223); and (c) that there are utterances with "verbless transitive structures" (i.e. with missing elements which are not arguments but predicates, pp.224). Radford's examples are shown in Figure 3.7 below.

Figure 3.7: Missing arguments.

(a) $[_{V''}\ [_{NP}$ mommy$]\ [_{V'}\ [_{V'}\ [_{V}$ open$]\ [_{NP}\ e_i\ ]]]]$.

(b) $[_{V''}\ [_{NP}\ e_i\ ]\ [_{V'}\ [_{V'}\ [_{V}$ want$]\ [_{NP}\ e_j\ ]]]]$.

(c) $[_{V''}\ [_{NP}$ Wayne$]\ [_{V'}\ [_{V'}\ [_{V}\ e_i\ ]\ [_{NP}$ sweetie$]]]]$.

Radford posits two analyses of these features of ECE, The first is that most immediately suggested by the above examples (a) and (b): i.e. that the missing arguments are "*null NPs* - i.e. NPs which are phonologically null". The lack of "syntactic licensing or identification conditions" in the absence of Functional Categories would allow the reference of the NPs to be settled purely by pragmatic factors. The slightly more radical alternative to this is the suggestion that missing arguments "are literally 'missing' from the syntax." Under this analysis utterances such as Fig 3.7(b) above would have the structure in Figure 3.8 below. This "subjectless and objectless" structure is supposed to express the idea that each participant role of the predicate has been "lexically saturated, [and] remains implicit, in the sense that it is a part of the lexical entry for the predicate concerned which is not projected into the syntax" (pp. 229-30).

Figure 3.8

$[_{V''}$ $[_{V'}$ $[_{V'}$ $[_{V}$ want]]]].

When these alternative analyses are placed in some kind of genetic relation with each other then they are a plausible model of syntactic growth. Radford (pp. 234-238) suggests that structures like Figure 3.8 may be more representative of one-word speech. An interpretation of this implication that Figure 3.8 develops into Figure 3.7(b) and beyond will be elucidated in 3.2. The suggestivity of these forms for future development notwithstanding, and skipping over the inability of either analysis to adequately account for 'missing predicates' (e.g. Figure 3.7(c)), Radford's interpretation of the child's holophrastic and two word utterances does seem to be a little rich in comparison with the rather more concrete interpretations given in 2.5. Specifically: (a) Radford has interpreted the 'vague, unspecified' relations expressed by two-word Locatives (e.g. 'mommy open', 'Wayne sweetie': Figure 3.7(a) & (c) above) as particular syntactic relations. This is a formal analogue of Tomasello's interpretation of these Locatives as "omitted prepositions" (see 2.5.2); (b) the structural difference between Figure 3.7(b) and Figure 3.8 is more apparent than real (Figure 3.7(b) has merely expanded two of the nodes explicit in Figure 3.8), and to impart such an extended structure to a holophrastic utterance like "want" is to make an implicit claim about the presence of predication in the child's thought: a presence

which is not *yet* directly indicated by the child's speech. This latter interpretation is apparently an instantiation of the Fodorean claim that strong logics (i.e. grammars) cannot in principle develop out of weak ones (see Fodor's contributions to Piatelli-Palmarini 1980; also comments in Ch1 above): the whole of the future syntactic development is here already, as part of the "lexical entry for the predicate". "In such a case there is virtual or implicit predication; but the language form is rudimentary" (De Laguna (1927), cited by Radford (op. cit., p234)): in Radford 'implicit' seems to mean 'elided' rather than virtual and the predication is real, just not pronounced (i.e. is phonologically null).

But the final failure of Radford's 'missing arguments' analysis is that it studiously avoids the fact that it is the part of the utterance most apparently similar to the Subject in adult speech (syntactically and semantically) that is most overwhelmingly often virtual in the child's utterances. Radford makes the point that arguments (and 'predicates') remain implicit if their reference is recoverable from the (non)linguistic context. This is similar to the point made earlier that it is the most salient, stimulating or disturbing components of a situation which are vocalised (2.5). In other words, newer experiences and data tend to be vocalised; background (i.e. context) tends to be left virtual. In all of Allison Bloom's speech up to & including 'ali 4' (i.e. all of her speech before the onset of functional grammatical devices) the component of situations most often left implicit in utterances is the child herself as originator or actor in situations. Of the 75 VP-type utterances in 'ali 4', over 3/4 accompany situations in which Allison is the actor and explicitly comment on her own activity (e.gs "eating", "open box", "walking around"). Most of the remainder functioned as requests or expressions of Allison's desires (and may have been 'proto-imperatives'). Of the smaller number (40) of utterances with explicit Specifiers (hereafter referred to as Specified utterances), only 14 (about 1/3) of the Specifiers are self-referential ("baby", or "baby Allison"). Some of the rest function as requests, but most comment on the behaviours of the toys as objective events (e.gs "baby doll ride truck", "cow out" (Allison pulling a cow off the truck), "hurt truck" (on the truck hitting the pig)). The virtual nature of self-reference is a special case of the implicit nature of contextual reference in the child's speech. Indeed, it is perhaps an expression of the virtual nature of the child's Self at this stage.

Beyond its semantic nature, though plausibly a result of it, the Specifier is structurally a kind of 'optional extra' in ECE. The following utterances are all attested in 'ali 4'.

Figure 3.9: Optional Specifiers in Allison's speech (at 1;10;0).

	eating		eat ... cookies	eat mommy cookie
no	eat		eat cookie(s)	eating mommy cookie
baby	eat	baby	eat cookie(s)	eat apple juice
		mommy	eat cookie	

The 'Subject-Verb-Object' word order of these utterances can adequately be explained as an accommodation to the Social Environment. It is more interesting that there is an asymmetry between the coherence as units of the Verb Phrases ("eat (mommy) cookie") and the apparently secondary nature of the Specification. There are also a number of Juxtapositional utterances in which the Specification is tentatively linked to the Locative or Verb Phrase.

Figure 3.10: Juxtapositions in Allison's speech (at 1;10;0).

mommy	...	blouse on
mommy	...	skirt on
baby doll	...	ride truck 'gain
wait cow	...	truck (urging the truck to wait for the cow)

This practical asymmetry is the first objective evidence in Allison Bloom's speech of a structural asymmetry between parts of an utterance. And if we continue our model of external practice (e.g. the reach) being a precursor of internalised thought (e.g. the point), then this asymmetric treatment of components of situations can be an external precursor of the internalised practice of predication. From this point on, it is possible to talk of one unit of meaning predicating over another - for example a Locative or a Verb Phrase. And it is only after this initial step in predication has taken place that syntactic structure along the Xbar model, which rests on the principle of predication, can begin its development.

3.2 "Late Child English".

3.2.1 The paralysis of syncretism and the generalisation of predication.

The following grammar can be descriptively adequate for Allison Bloom's speech for 'ali4':

Figure 3.11:

Utterance --> (Specifier) Predicate.

Specifier --> Word / Compound (group of words referring to one item).

Predicate --> Word / Compound.
Locative.

Locative --> two words 'schematically' related:
(a) item names.
(b) 'prepositional phrase'.
(c) 'verbal phrase'.
(d) 'adjectival phrase'.

This grammar allows primitive modes of speech to coexist with the more advanced forms which are just emerging. For example, the primitive item-name Locatives tend not to appear accompanied by a Specifier. The grammar also shows the transitional, unstable nature of Allison's language at this point. Predication is only explicit (i.e. actual) in the initial disjunction of Specifier and Predicate: any predication inside Locatives is implicit (i.e. virtual). However, the accommodations to Socially licensed word order, which have already been noted, are becoming increasingly regular, such that Locatives generally consist of some Word or Compound *preceded by* a word corresponding to an adult verb, preposition or adjective. 'Pivot grammar' (e.g. Braine 1976) is essentially a description of this early predication, where a small

and well-defined closed group of words (pivots) apparently qualifies a larger and more unrestricted group of words.

If the objective asymmetry between preposition (verb, adjective: for now I'll refer to these three parts of speech as 'pivots') and the following phrase can be internalised, then it would seem to be a short step to generalise the Specifier-Predicate relation from the gross shape of utterances to a basic relation between words. This internalisation and generalisation is the kind of psychological process modelled in 2.3-2.5 and has accompanied the child's cognitive growth from birth. The imitation of initial pivots in adult speech is an expression that this superficial feature of adult speech has indeed been internalised. Generalisation is an effect of associative thinking - one item with certain features is associated with a second item with some similar features; features which may be absent or only implicit in the second item may then be strengthened and become a more salient feature of both items. The Syncretic thinking of the child by which this kind of association and generalisation is carried out has been becoming gradually more abstract from the onset of language at around the end of the first year (2.5). This abstraction comes in several forms: (a) the increasing attention to the Social Environment's commentary on the Physical Environment, rather than to the physical environment itself - for instance in the internalisation of only socially licensed associations between objects, and the building of conceptual rather than Complexive items; (b) the tendency to reduce associating features to a singularity, for example 'green', 'Allison', 'on' each tend towards having a single deciding feature which is abstracted from experience and associated with the name itself rather than with (a set of) particular objects. These tendencies are further encouraged by play in the Social Environment, both in terms of settling word meanings, and in regularising the relations between words. Caregivers' differential repetition of children's primitive utterances (see 1.1) is only the latest and most abstract example of play and commentary as an attracting influence on the developing child.

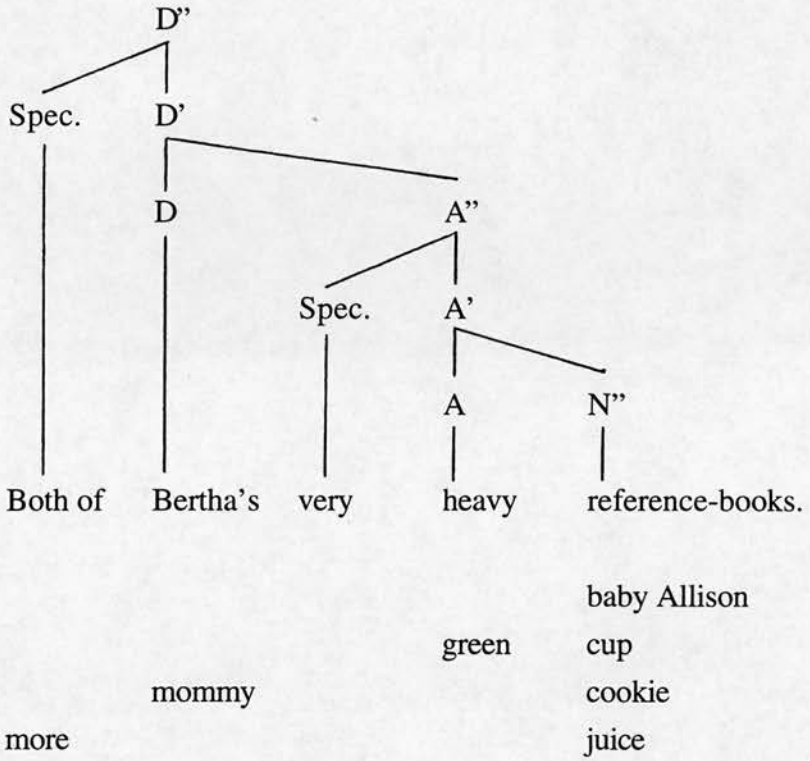
The Specifier-Predicate relation then, can be generalised through the whole system of Early Child English - at least as a tendential point towards which the child's performance seems to be moving.

Figure 3.12: Predication generalised through ECE grammar.

	Specifier	**Predicate**
Utterance	Noun	Locative
Locative	Preposition	Noun
	Verb	Noun
	Adjective	Noun
	Noun	Noun

As the table suggests, there seems to be little structural difference in the treatment of those Parts of Speech which would operate within the Noun Phrase, and those which would act upon it externally. In a post-Abney (1987) Government-Binding framework of the kind used by Radford (1990), 'Determiner Phrases' are 'Modifiers' of Prepositional or Verb Phrases; and Adjectives and modifying Nouns (e.g. in the genitive) all have positions within the 'Determiner Phrase'. Figure 3.13 illustrates, with examples of comparable utterances from Allison Bloom. Evidence of a structural difference is first apparent when adjective-noun and noun-noun Locatives begin to appear in Utterance-Specifier positions (e.g. "baby Allison comb hair") as well as in Locative-Predicate positions (e.g. "there baby cup"). The tendency for prepositions and Verbs is to remain only in Locative initial position.

Fig 3.13: the Determiner phrase in adult English.



However, this analysis is purely formal and though the form of the child's utterances is approaching the sentential form of the adult language, the content - that is the types of word meaning available - is still quite dissimilar to that of the adults'. In adult English the Sentential Specifier is the Subject and its semantic properties are less central than its syntactic properties. That is, the Subject's relation to the speaker and the non-linguistic environment is less important to the word's Subjecthood than its relation to the other words in the sentence. In children's English the Utterance Specifier is still closely tied to a Complexive semantic role: its most defining features are those in which the word is related to the non-linguistic environment.

Certain properties of Allison Bloom's 'Subjects' are mentioned in 2.2. As was pointed out, both implicit Specifiers in Allison's Locative utterances and explicit Specifiers in her Specified utterances referred to objects demonstrating some kind of intentional activity. First Allison's Locatives accompanied her own effortful activity, later her mother's and other objects which seemed (to Allison) to be behaving in a similar way. Evidence for this step of interpretation is that Allison would accompany these two types of event with similar utterances. The events being described in

Allison's Specified utterances in 'ali 4' are of the same highly effortful, highly effective, in other words highly transitive, kind as are accompanied by Locative utterances: that is, eating, driving, movement.

The move to Specified utterances is apparently a move away from talking about oneself. Self-referring unSpecified utterances are present in 'ali 5' and even 'ali 6', where they formally co-exist with adult-style imperatives, but Specified utterances very soon become the dominant mode of linguistic expression: from 40/307 utterances in 'ali 4' (12;10;0) to 125/297 utterances in 'ali 5' (2;4;7) and 242/419 in 'ali 6' (2;10;0). Allison is a frequent referent of these phrases, even the dominant one (almost half in 'ali 6'), but the involvement of the self does not over-ride in salience the notion of directed activity and events which do not involve the self. These features of utterance Specifiers are attested not only in the Allison Bloom corpus (Bloom 1973, MacWhinney 1991) but have been noted in several studies of comparable children from various cultures (Berman 1986 on Hebrew, DeLemos 1981 on Brasilian Portuguese, Schieffelin 1981 on Kaluli[55], Slobin 1966 on Russian). The early Utterance Specifier seems to express an 'Active Self', tending towards expressing a variety of 'Agent' as the 'Self' component is weakened.

Other parts of Early Child English are not yet differentiated into Parts of Speech. The difference between Prepositions and Verbs has yet to be made firm in Allison's language. Utterances such as "baby down chair" and "cow out" (in 'ali 4') indicate that prepositional Locatives still have a verbal aspect. Similarly, there is no syntactic differentiation - and little evidence for a semantic one - between genitive-Locatives ('baby cup', 'mommy cookie') and genuinely 'locative'-Locatives ('mommy shower') or between adjective-Locatives ('apple juice', 'green cup') and compound noun-Locatives ('baby Allison'). The same simple before-after relation characterises them all. There is a marked difference in use however as the former pair draw a relation between two objects named, the latter pair name a single object. A notable development is that while at first Locative phrases are only attested in Utterance-Predicate positions and all Specifier positions are short one word phrases; later (a little in 'ali 4', primitive speech in 'ali 5') 'adjective-noun' and 'noun-noun' Locatives may also appear in Utterance-Specifier positions.

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55 Ergative-absolutive languages like Kaluli seem to present problems only at this stage in development. Early Utterance Specifiers in these languages do seem to fall into the general pattern outlined in this thesis. See Matthei (1987) for further references.

3.2.2 The transition into "Late Child English".

For Radford (1990) the development of Early Child English into the more adult Late Child English is adequately described as the acquisition of the Functional categories - Determiner, Complementiser and Inflection - and their corresponding phrase structure. By way of explanation Radford cites "the *maturational theory* of acquisition proposed by Borer and Wexler (1987). The essence of the maturational theory is that different principles of Universal Grammar are genetically programmed to come into operation at different biologically determined stages of maturation."[56] The maturational theory seems to be a special case of the nativist perspective of Formal Linguistics: the innateness hypothesis discussed in Chapter 1 is expanded to incorporate "biologically predetermined" development after birth. As such, the criticisms of the innateness hypothesis in Chapter 1 hold against the maturational theory and shall not be reproduced here. Suffice it to say that not only is the prenatal presence of a Universal Grammar presupposed, but this UG is supplemented with a schedule for linguistic development. In the maturational theory the psychological development outlined above is an irrelevant epiphenomenon of the biological maturation of the linguistic organ.

Radford's claim is that the transition into LCE primarily involves the acquisition of new structural apparatus: that the change is both relatively unintentional and relatively sudden. Both of these claims are challenged by observational studies of this period of linguistic development. It appears in fact that the transition is accompanied by similar bridging phenomena to those evident in the transition from holophrastic to two-word, and from two-word to multi-word speech; namely: Rote Memorisation, Phonological Extension and Juxtaposition (see 2.5).

The Rote Memorisation of more advanced forms of speech as unanalysed wholes is a constant practice of the child. Imitated phrases tend to be prosodically similar to the utterances the child is producing independently and they tend to be the more cliched phrases of the child-directed adult language. The song 'Mary had a little lamb' is a regular component of the play sessions with Allison Bloom and Mommy, and Allison often breaks into snatches of it. However, in early files these snatches are limited to single word or mumbled phrases (e.g. 'mm Mary', 'lamb' in 'Ali 2'); in 'ali 5' there is the following relatively confident outburst (Figure 3.14). Although

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56 Radford (1990: 274).

Allison's syntax is developing already by 'ali 5', no utterances are quite as confidently pronounced as the "Mary had a little lamb" clauses reproduced below: in particular, non-personal pronouns are virtually unattested.

Figure 3.14: Mary had a little lamb.

```
*ALI: Mary had a little lamb fleece white as snow.
     %act: <1w> puts horse on floor and turning back to
box
*ALI: little lamb.
     %par: <1w> singing
     %act: <1w> reaching in box, taking out lamb
*ALI: little lamb.
*ALI: Mary had a little lamb.
*ALI: little lamb.
*ALI: little lamb.
```

Phonological Extension is an expression of the child's appreciation of the longer prosodic contours of adult speech. In earlier transitions the appreciation was expressed by incorporation of babble elements into the child's utterances, in 'ali 5' this option is far less common - the child's potential speech seems to be more limited to socially licensed forms. More often Allison uses adult words as prosodic placeholders. Figure 3.15 shows a list of some examples of this.

Figure 3.15: Phonological Extensions in 'ali 5'.

```
a big cow and daddy cow and mommy xxx cow
          and baby small cow
a sheep
and baby cow
and get up
and have your snack
and jump down
```

```
maybe could play exercises with them
now take this cow out
oh spilled it again
```

As we can see, these prosodic placeholders ('a', 'and', 'maybe', 'now', 'oh') invariably occur utterance initially, and most often where one would expect the Adult English Subject. It should be noted that 'a' and 'and' are exceedingly rare in 'ali 5' (and are not attested in earlier files) and they occur more often utterance initially than as indefinite articles or conjunctions.

Perhaps the position of Utterance-Specifier is already somewhat identified in the child as a potential place for a word. Phonological Extension in other places within the utterance tends to take the form of either babble or syntactic confusion of the kind shown below (Figure 3.16). These utterances have been listed in an informal order of interpretability: the first describes a column of toy animals; the second seems to express something like 'these animals don't want (a drink)'; in the third the relation between the chair, the cows and mommy is vague even from non-linguistic context.

Figure 3.16: Allison's syntactic confusion in 'ali 5'.

```
may xxx could they marching in a parade
and don't these animals
in a chair ... playing these cows and mommy
```

Juxtapositions as before link two components of the presented situation. At this stage of development however, the child's innovation of structure is limited to the grammar she has developed for herself. Juxtaposed elements are each grammatical in terms of the above grammar; the relation between them, being vague and unSpecified, can be characterised as Locative. These Juxtapositions can be separated into three groups (see Figure 3.17): in the first and most primitive, separate statements about the situation are placed in succession. This is most often a simple temporal succession as in 1 & 2 (and this seems the most common use of 'and'), sometimes as in 3 the succession is one of internal reasoning.

Figure 3.17: Juxtapositions in 'ali 5'.

1

*ALI: lie down here.
*ALI: and get up.
*ALI: and way tall.
*ALI: and jump down.

2

*ALI: that big cow.
*ALI: and that daddy cow.
*MOT: where-'is the daddy cow?
*ALI: right there xxx cow.
*ALI: and baby cow.
*MOT: what are they again?
*MOT: tell me again.
*MOT: what-'is this?
%gpx: <1w> points
*ALI: a big cow and daddy cow and mommy &k xxx cow and baby &n small cow.

3

*ALI: too much traffic at airport.
*ALI: I have carry her.

4

*ALI: Clementine.
*ALI: want go to airport.

5

*ALI: oh I do-'nt want drink it.
*ALI: out cup.

6

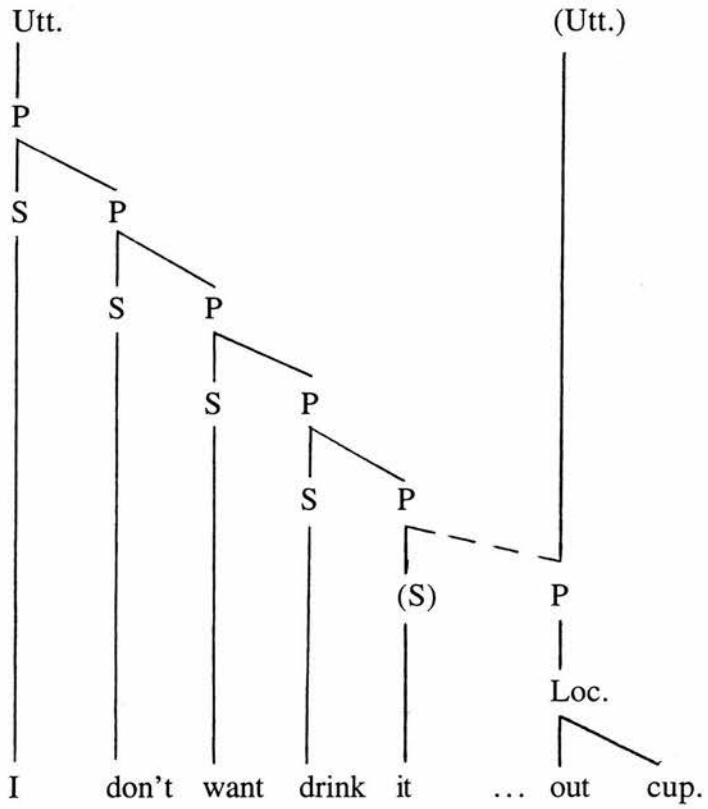
*ALI: sheep gonna march.
%act: <aft> marches around animals
*MOT: where are they marching?
*ALI: to a home.

7

*ALI: what-'is in here.
*ALI: it-'is a pig!

The second group of Juxtapositions (4 & 5) involves the relation of components of a single statement, referring to a single act or event. These are slightly more interesting than the first set as there is more of a relation of modification rather than mere succession between the two utterances. Certainly the two utterances of 4 are in a Spec-Pred relation, as has been described; also the second utterance of 5 seems to be a modification of the first. The interpretation of 5 as Spec-Pred would seem to be controversial, however, unless the grammar allows nested Spec-Pred pairs, in which case 'it' would be the predicate of the phrase 'drink it', and the Locative 'out cup' would function as the most deeply embedded Predicate in the utterance, Specified by 'it', as in Figure 3.18 below.

Figure 3.18: Embedded Predication.



A structure like this has two interesting properties. The first is that any P(redicate) node can stand as a grammatical Utterance in its own right - utterances of the form 'out cup' and 'it out cup' are already common in Allison's speech (if we

ignore for the moment the pronoun's neologism). Secondly, the modifying utterance 'out cup' is able to marry neatly into the main utterance, creating its own 'space' almost as if one had been reserved for it. This second feature of the relation between utterances may perhaps illustrate the growing predominance of structured Predication as a default relation between units, replacing the more primitive Locative relation.

This brings us to the third group of Juxtapositions (6 & 7 in Figure 3.17). These question-answer games[57] apparently demonstrate that Allison is in fact already quite developed syntactically - aware that a Prepositional phrase and a Noun Phrase are required as answers to the respective questions. Whether Allison is aware of the entire structure of the question utterances, or whether she is responding to a perceived 'space' at the end of the question utterance is debatable. For example, the presence of an utterance final 'space' may be signalled prosodically: rising, question-shaped intonation is used by Caregivers from well within the first year, to invite a response from the child; this is in contrast to the falling, declarative-shaped intonation of the Caregiver's response or game-final utterances - "It appears as if she uses falling-rising (U-shaped) prosody to invite infant response, and falling tone to acknowledge or 'sympathise with' an infant utterance."[58]

These Juxtapositions are certainly more than Locatives however: this is evident from the use of such words as *to* and *it-'is*. Words like these are neological in two senses: firstly they are first encountered in 'ali 5' and even here they are not yet occurring frequently or regularly; secondly, they are words which operate in a distinctly new fashion in the child's speech. These words (like 'and' above) predominantly function as linking words between utterances. Thus the relation between the utterances no longer need be "vague, unspecified", but the relation itself is being made particular, i.e. is being Specified by the linking word. In a sense these linking words become a socially licensed name for the relation, and the relation itself is then much more open to social influence - in the same way that object complexes drift more rapidly toward a socially licensed extension once they have a socially licensed name (see 2.5).

Accompanying the spread of formal Specification there are changes in the meanings of certain words. The newly acquired Prepositions (like 'to' above) which Specify relations have a function approaching that of the adult language; other lately

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57 I use the word 'games' to recall the contribution of play to the child's development. The self-directed question-answer couplet in (7) suggests that the game is a familiar one to the child - possibly accompanying physical play or looking through picture-books.

58 Trevarthen (1987: 187).

acquired prepositions (e.g. 'on', 'in') also have an adult relational function. This shift in function is evident both semantically, in that prepositions are now more regularly used to relate objects within an event rather than to name the event itself, and structurally, in that they will now only appear in predicates Specified by a verb (prepositions replacing Locatives inside Noun Phrases seems to be a slightly later development). Prepositions are apparently beginning to form into a class - although earlier acquisitions (e.g. 'out', 'up') may still occasionally show their more verbal aspect. This simultaneity of shifts in function and form, such that they may be looked on as a single event, is significant and has relevance for other developments.

A comparable shift in meaning seems to occur in children's forms of self-reference. Budwig (1989) follows six children (age 1;8 - 2;8, MLU[59] 1.7 -3.9 at onset of study) over a four month period; videotapes were taken twice a month of the children playing with either a caregiver or a familiar peer. The study is similar in method to the study of Allison Bloom and the window of development is similar to that of Allison up to the period of 'ali 5'. The six children of the Budwig study fall quite neatly into two groups of slightly more primitive and slightly more advanced speakers. The first group, whom Budwig calls "Ego-anchored" are a little younger, have a lower MLU and have a high reference to Self in 'subject position' of their utterances; the second group tended to be older with a higher MLU and a greater variety of referents in 'subject position'. The forms self-reference took also varied: details are given in Figure 3.19.

Figure 3.19.

Table 1: broad differences (Budwig's Table 1).

Group	Age	MLU	'subjects': (%)		
			Self	Other	Joint
Ego-anchored	2;0	2.2	82	15	3
non-ego-anchored	2;6	3.5	50	37	13

59 Mean Length of Utterance - generally stated in terms of words or morphemes.

Table 2: Distribution (%) of Self reference forms (Budwig's Table 2).

Group	*I*	*My*	*Me*	'Other'	'Name'
Ego-anchored	33	37	13	4	14
Non-ego-anchored	60	8	2	23	7

The Ego-anchored children were so-called because the Self was the predominant 'subject'. In other words the Utterance-Specifier is a variation of the 'Active Self' referred to above (2.2, 2.5). They also have a range of applicable Self-reference terms. In contrast the language of the Non-ego-anchored children is much more isomorphic with adult language: 'Subjecthood' is not limited to the Self; Subject Self-reference is more limited to "I". Budwig does not explicitly place these two groups in any developmental relationship with each other, nor does the study track the development of the children's speech over the four month period. 'Ego-anchoring' is presented as a state rather than an activity during a period of transition. However, the interpretation is there to be made, that the move away from 'ego-anchored' speech toward more adult (i.e. socially licensed) forms is part of the child's linguistic development.

The spaces between the samples of the Allison Bloom data means that this whole transition is overlooked. In one step Allison jumps from speaking largely in unSpecified, Locative utterances in 'ali 4' (1;10;0) to the virtually adult speech of 'ali 5' (2;4;7). Self-reference in 'ali 4' is by way of names ('Allison', 'baby') and this includes Self-reference in 'subject' (i.e. Utterance-Specifier) position, like "baby Allison comb hair". Without claiming that all individuals follow the same rigid path for language acquisition, I think it is necessary to assume a certain amount of generality, where the evidence is not against it. Thus I intend to assume that the course of the Budwig children's language development has been grossly similar to that of Allison Bloom: specifically, that early 'subjects' would first have been implicit and later 'subject position' Self-reference would have been by name. This does not appear to be contradicted by the data.

The body of Budwig's paper consists of an examination of the different semantic properties of the different Self forms in 'subject position' in the speech of the Ego-anchored children. The contrast between "I" and "my" is treated in most detail as it seems statistically the most significant, and "me" and nominal reference are treated separately. Nominal reference was predominant in more primitive utterances, in games

and in "reference to depicted action": in other words "in acts of naming, identifying and describing"[60] rather than as part of speech as a corollary to action. The Self may be part of some event or action (e.g. "Grice ride bicycle"), but is being depicted as an object.

Pronominal Self-reference was found to have relation to a complex semantic definition of Agentivity (outlined below in Figure 3.20a; Budwig's Table 3, p272) and to the pragmatic function of the utterance. "My" tended to be used with Utterance-Specifiers of high agentivity, in particular "in conjunction with highly kinetic verbs referring to telic actions", and in utterances "in which the child attempts to use language to bring about a change in the environment" (i.e. utterances functioning pragmatically as acts of control). "I" was associated with low agentivity "in utterances expressing the children's internal states and intentions" and in more assertive or declarative utterances where "control is not at issue"[61]. These correlations were pronounced and cumulative - see Figure 3.20b (Budwig's Table 6, p278). The somewhat rarer (13%) pronominal Self-reference form "me" is associated with events when "the child acts as instigator of actions that are directed back onto the Self" and thus is said to label the Self as "affected Agent" (p279).

Figure 3.20.

(a) Budwig's complex of Semantic Agentivity parameters.

	Agentivity ranking		
Parameter	High	Mid	Low
Participants	2 or more	reflexive	1
Kinesis	Highly kinetic verbs	Action verbs requiring minimal effort	Stative verbs
Aspect	Telic situation	ambiguous	Atelic situation
Volitionality	Purposeful action	-	Non-purposeful action / happening
Affirmation	Affirmative	-	Negative

60 Budwig (1989:279).

61 Budwig (1989:273-7).

(b) Distribution (%) of *I* and *my* across semantic agentivity and pragmatic function clusters.

Cluster		Form	
Pragmatic function	Semantic function ranking	*I*	*my*
Control act	High	-	100
	Low	60	40
Assertive	High	35	65
	Low	82	18

The fact that the 'non-ego-anchored' children use only *I* in Utterance-Specifier position implies that this increasing differentiation of Self reference function (which is not present in the earlier speech of Allison Bloom) has a structural correlate, similar to the structural changes that Prepositions undergo in this period (see above). Social licensing will provide the necessary guidelines for locating *I*, *my*, *me*, and nominal terms within an utterance, and the child's own structural appreciation is sufficient to translate this linear location into location within an embedded Spec-Pred structure.

The acquisition of the rest of the system of 'Functional Categories' seems to occur in the same piecemeal fashion. For example, O' Grady et al. (1989) follows the acquisition of certain functions associated with INFL and the Subject in the linguistic development of three children[62]. The children's utterances in transcripts of play sessions of the children over the appropriate age/MLU range were examined for (a) utterances containing tokens of 'Subject Taking' verbs, i.e. copulas, inflected verbs, auxiliaries, 'semi-auxiliaries' like *hafta* ('have to') and *gonna* (going to), and modal verbs, all of which require subjects in adult English; and (b) the actual presence of a 'subject' in these utterances: 'omitted subjects' and intelligible material in Subject position were ignored. The study's results for one of the children (Eve) are reproduced in Figure 3.21 (O' Grady's table 2, p521).

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62 Two of whom are incidentally from the Brown (1973) study - Adam and Eve.

Figure 3.21: Tokens of Subject Taking verbs with/without subjects: Eve.

Age	MLU	Modal	Semi-aux.	Aux.	Inflected main verb	Copula
1;9	2.55	0 / 0	0 / 0	0 / 0	0 / 5	2 / 4
1;9 1/2		0 / 1	3 / 0	2 / 1	3 / 6	3 / 0
1;10	2.8	3 / 0	1 / 3	4 / 1	9 / 4	0 / 0
1;10 1/2		3 / 0	3 / 2	0 / 2	9 / 8	2 / 1
1;11	3.2	2 / 0	1 / 5	4 / 0	9 / 6	1 / 0
		-				
1;11 1/2		8 / 0	10 / 4	3 / 2	11 / 6	3 / 0
			-	-		-
2;0	3.0	0 / 0	11 / 0	6 / 0	13 / 2	15 / 0
					-	
2;0 1/2		11 / 0	49 / 0	5 / 0	25 / 0	3 / 0
2;1	3.4	28 / 2	22 / 3	5 / 0	11 / 2	19 / 0
2;1 1/2		8 / 1	34 / 3	12 / 0	10 / 1	11 / 0

- Horizontal lines indicate acquisition points.

In each column figures before the slash represent tokens of that category that appeared with subjects, figures after the slash represent those without. As we can see there is a growth over the period both in absolute number of appearances of each form, and in the relative proportion which appeared with Subjects, i.e. which were Specified by an appropriate Noun Phrase. Acquisition points were located where Subjects occurred over 90% of the time and with evidence of productivity rather than of rote memorisation. Notably the acquisition of the forms can be studied separately, indicating that the notion of a maturation of a single INFL category might be ideal rather than abstract. More specifically, their separate development at different rates implies the development may be part of a concrete process like that of the shift in properties of Prepositions or of terms for Self reference. This implication is strengthened when we consider the individual differences in rates and orders of development of the verb forms across the three children in O' Grady (1989), as in Figure 3.22 (after O' Grady's table 8, p527). The children take from just one month to over five months (at the end of the study Seth's Modals and semi-auxiliaries are still

not regular) to acquire these linguistic functions, and the acquisition occurs at widely different ages.

Figure 3.22: Orders of development for ST verb classes.

Child	Modal	Semi-aux.	Aux.	Inflected main verb	Copula	Time span (months)
Eve	1	2	2	3	2	1 (1;11 1/2 - 2;0 1/2)
Adam	5	4	3	2	1	3 (2;9 - 2;11)
Seth	3	3	2	4	1	5+ (2;0 - 2;5)

This period, characterised as Late Child English, consists of a cluster of changes which seem to be consequent on the development and spread of predication. As particular advances are piecemeal and concrete, their course is plausibly facilitated by Social licensing. By the end of this period - whenever it occurs and however long it lasts in each particular child - the child's language is grossly comparable with the Language of its Social Environment - as with Allison Bloom's language in 'Ali 6'. An important feature of the child's language at this point, and possibly that in which it most resembles adult language, is the extent to which an utterance obtains meaning as a sentence in its own right, without recourse to the non-linguistic environment for semantic supplementation. The child's language becomes abstract in two ways. Firstly, it is separated from its non-linguistic context and independent of it for resolutions of meaning: this is especially the case after the Tense, and Case systems have been refined.

Secondly, the child's vocal expression of concrete relations (e.g. in Locative utterances) gives way to a communicative representation of these relations in linguistic structure. The structural correlate of meaning shift has been demonstrated above in the Specification of Locative utterances by the later acquired Prepositions and in the differentiation of Self reference terms. That this structure ceases to be merely a correlate and comes to guide linguistic thinking is implied by the power of the generalisation of Predication, and is evident in such experimental studies as Matthei (1987), in which the transition from Utterance-Specifier to Subject in developing grammars is portrayed as a shift from a meaningful Agentive definition to the Socially licensed definition - primarily syntactical, and semantically empty or at least vague.

Interestingly with respect to Piaget's and Vygotsky's work on the development of formal thinking as a social skill, this latest linguistic development often occurs during the years of formal education - Matthei cites for examples Hakes (1980) and Strauss (1982).

3.2.3 Generalised Predication.

It remains to summarise in a more explicitly formal fashion this development of Predication in the child's language. This last section is intended to be taken as programmatic and suggestive rather than definitive of the ideas expressed in the thesis. The definitive portrait is to be found in the concrete descriptions in Chapter 2 and the rest of Chapter 3.

The linguistic development may be presented as a chronology of grammars, as in Figure 3.23 (c.f. 2.5.4, Fig. 2.24). These will be summarised in turn.

Figure 3.23: A chronology of grammars.

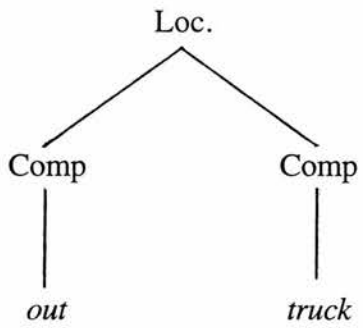
name (Radford 1990)	**name (this thesis)**	**example**
pre-linguistic	Complexive	*da*
single-word	Holophrastic	*truck*
early multi-word ("Early Child English")	Locative	*out truck*
	Predicative	*cow out truck*
later multi-word ("Late Child English")	Generalised Predication	*the cow is coming out of the truck.*

Complexive speech is described in the latter part of 2.4 which is concerned with the vocal expression of subjectively developed cognitive forms. Holophrastic speech (2.5) differs from this in that utterances tend to be limited to Complexes with a Socially licensed phonetic form. This influence of the Social Environment encourages a move toward abstraction and the beginnings of more formal thought - the child

comes to rely on Social licensing as much as on subjective experience for the content of its forms.

Locative speech (Chapters 2.5 & 3.1) involves the collocation of Complexes into 'vague, unspecified' relationships. It is meaningless to describe Location as Predication both formally, as there are invariably only two terms in an utterance, and semantically, as qualification of a content word by a 'pivot' seems to be the exception rather than the rule (and often limited to rote memorisations - e.g. 'more cookie'). Thus the structure of these utterances is a simple binary partnership as shown below (Figure 3.24).

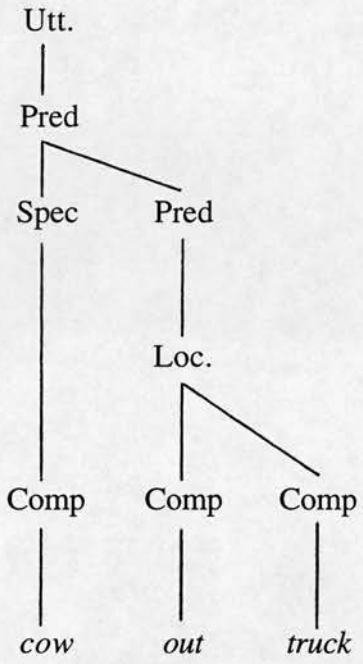
Figure 3.24. The structure of Locative utterances.



i.e. Loc. --> Comp Comp.

The development of Predicative or Specified utterances (Chapters 3.1-3.2) is consequent on the appearance of 'optional' Specifiers. For example, the Locative utterance 'out truck' may coexist in the child's grammar with the utterance 'cow out truck'. 'Cow' seems to relate to the Locative 'out truck' as a unit: both structurally and semantically as it seems to qualify the event or state referred to in the Locative. Thus Predicative speech would have structure as in Figure 3.25.

Figure 3.25. The structure of Predicative utterances.



i.e. Utterance = Predicate.

Pred --> Spec Pred.
--> Loc.

Spec --> Comp

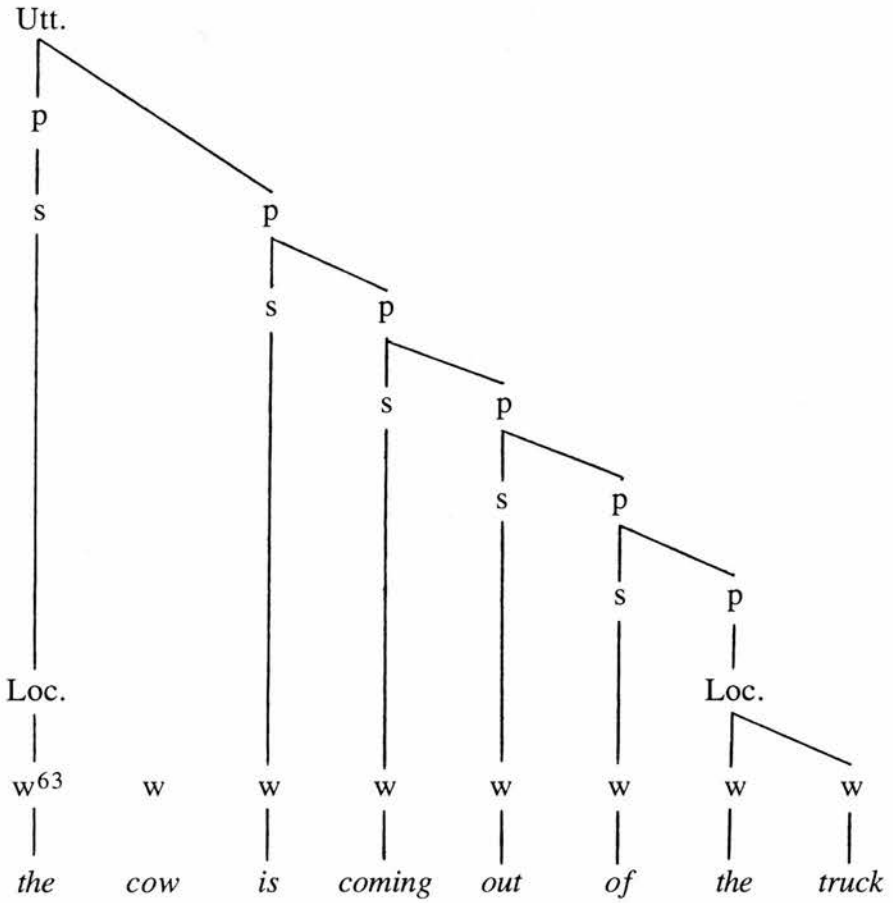
Loc. --> Comp Comp

It is noteworthy that primitive and advanced forms are compatible not only within the grammar as a whole, but also within particular utterances. Note also that although presentation is formal the grammar is very concrete in that it relates only to the 'surface' or attested form - any two word utterance is still a Locative and all Predicates are two word Locatives with an outside Specifier.

The Spec-Pred relation is generalised throughout the child's grammar as the size of its utterances grows and larger units need to be related. The child seems to imitate the adult surface forms and only secondarily develop its formal apparatus to

encapsulate the larger structures that ensue. There are many examples in the Allison Bloom data of utterances where the Spec-Pred relation seems only to have been partially generalised: from Juxtaposed utterances like "Don't want drink it ... out cup" (see 3.2.2 Fig. 3.18) to later utterances wherein structure embedded furthest inside the sentence seems to become confused. For examples, "no I'm gonna sitting", "when me comes on" and "this will carry it the airplane" said with one intonation contour and where the airplane is apparently the carrier referred to. The important development however is that all conceptual relations come to be linguistically represented as Specified Predicates, as in 3.2.2 Fig. 3.18 and as in Figure 3.26 below.

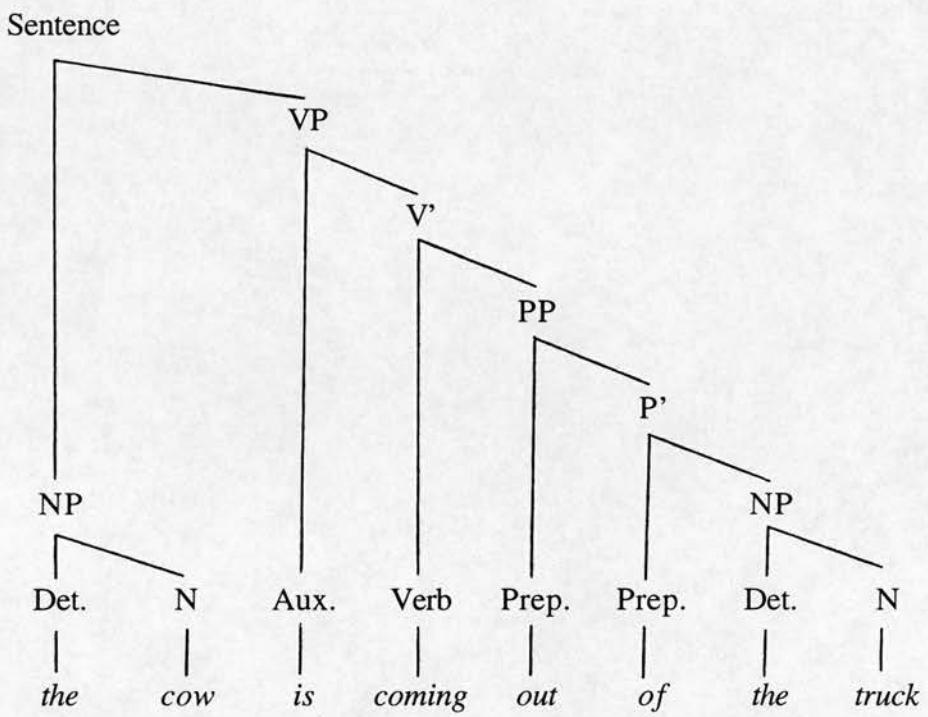
Figure 3.26: The structure of utterances with Generalised Predication.



63 By now the child's vocal Complexes are sufficiently abstract and isomorphic with the Social Environment to be called words.

The generality of Predication has consequences throughout this system. Firstly, the Locative relation becomes increasingly rare such that even two place phrasal elements can be interpreted as Specified Predicates. Also, a substantial aspect of a word's meaning comes to be structural, i.e. the contribution a word makes to the meaning of an utterance is derived partly from the structural relation it bears with other words of the utterance, rather than purely from the non-linguistic context. Thus words develop into 'parts of speech' and the homogeneous Spec-Pred phrasal structure can be differentiated into particular phrasal categories. Figure 3.26 can be rewritten as Figure 3.27.

Figure 3.27: Differentiated Predication.



This Differentiated Predicate structure seems sufficiently similar to the structures of mainstream formal linguistics (e.g. Haegeman (1991)) to be able to describe some of the more abstract properties of adult language - for example, relations between discontinuous constituents; between active and passive voice; between declarative, imperative and interrogatives; and the nature of the so-called 'empty categories' (see Haegeman p393-438). However, as pointed out above, it has

not been the intention to define a fully developed syntactic formalism in this last section. The explication of the implications of this 'Differentiated Predication hypothesis' is a matter for further research. The intention here has been to arrive at formal syntactic structures via analysis of developing behaviour, and to explain the abstract entities therein in terms of more primitive and more concrete entities. The development of the abstract and formal concept of Subject from concrete notions of the active Self has been the focus, rather than the limit of this investigation.

4 Conclusion.

The dialectical synthesis of Chomskyan Formal Linguistics (CFL) and experimental psychology has produced a rich and coherent picture of the emergence of abstract linguistic forms from the more concrete behaviour of the pre-linguistic infant. The formal psychology put forward in Chapter 2 was based on an application and development of Vygotsky's ideas. It embraces methods and structures from both linguistics and psychology in a principled rather than eclectic way, to produce an account of first language acquisition apparently more empirically accurate and more generatively powerful than either field alone.

Development of the Subject has been the focus of this study, though not to the exclusion of other logically or historically related phenomena. Thus the development of the Subject can be seen as a portrait in little of the development of language as a whole. This is hinted at in the final section, and there are specific proposals for expanding the hypotheses of Generalised and Differentiated Predication to the description of various structures of adult English syntax .

The thesis is rich in implication, and points to many areas of potentially fruitful research in both linguistics and psychology. There seem to be three main projects in psychology:

(i) It will be challenging to establish more concretely the nature of the postulated phenomenological environments, namely: the time-spaces; Subjective Space-time; and the Social Environment. These structures seemed to be licensed by behavioural evidence, but this evidence was sufficient only to generate a vague and abstract notion of the phenomenological environment.

(ii) There are no claims made about the relative conservatism of the child's cognitive development; in other words of the continuity of 'primitive' forms like Schemata and Complexes in more advanced (i.e. adult) cognition. There seems to be a case for such continuity in the less socialised activities (e.g. dreams, subjective experience of time passing) and in habitual or expert activity (e.g. an accomplished dancer may experience the dance holistically, rather than as a co-ordination of separate actions).

(iii) There is an interesting parallel between Vygotsky's Complexes, and their potential to describe cognitive development, and the emotional Complexes of Freud. A materialist critique of psycho-analysis and psycho-therapy along the lines of

Vygotsky's critique of Piaget and the preceding critique of CFL, would seem to be a promising avenue of study.

In linguistics the potential for further research consists in generalising the ideas from the development of the Subject to more expansive investigations into language:

(iv) The empirical data used to license Generalised Predication were almost exclusively from the acquisition of English. This immediately raises the question of the applicability of both the initial development of Subject and the generalisation of Predication to the study of other languages. This is in effect a call for separate studies on the acquisition of other languages as a first language (i.e. L1 acquisition), informed by the methods proposed in this thesis. As a first approximation, the critical approach described here could be applied to detailed descriptive studies of L1 acquisition, such as Ochs (1988) on Samoan, or Gvosdev's studies of Russian (e.g. Gvosdev (1961); see also Slobin (1966)). It would of course be against the spirit of this thesis to base a description of L1 acquisition on an account of the adult syntax, no matter how concrete or descriptive.

(v) A special case of the above study would be to test the application of my ideas to acquisition of Ergative languages. These are languages which do not seem to have syntactic Subjects, in the sense of external arguments of intransitive predicates - i.e. in these languages the sole argument of an intransitive predicate is the 'Object' or 'Patient'. Samoan is an example of this kind of language. This is a direct challenge in that the development of Active Self into Subject seems to be entirely negated in these languages. As with (iv) above, addressing this challenge would involve concrete study of a particular language. However, the theoretical status of Ergativity itself is under debate from within linguistics and the approach to an 'Ergative' language would also have to engage critically with the notion of Ergativity.

(vi) Finally, it seems that whichever formalism is used to describe linguistic structure - in the adult speaker/listener, in the 'linguistic community', in the text even - must be constantly open to development and change. This thesis is as critical of the notion of the 'Steady State' as it is that of the 'Language Acquisition Device'. And criticising language acquisition as 'identification in the limit' is equivalent to criticising the notion that language acquisition has an 'end'.

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6 Appendix: Particularising the Intranet.

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Particularising the Intranet

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1 The neo-nate: separate Localities

The behaviour of the neonate is notoriously unfocussed, undirected and uncoordinated: the infant will for example attempt to grasp anything touching its palm, to suck whatever brushes its lips. At the same time there is no attempt to recover objects lost - no behaviour at all interpretable as a directed search, or of awareness of object permanence (Piaget 1955: 56). Further, the infant does not coordinate its separate behaviours, for example manipulation of grasped objects toward the mouth does not begin until several weeks after birth.

After Piaget these separate behaviours present at birth may be called Reflexes. Grasp and Suck are two more salient examples. These Reflexes are Local in that they operate within a small and well defined locality (Grasp initially operates involving only the palm and fingers of the hand); they are Independent in that only events within that location become stimuli, in other words Localities are not associated; they're Automatic in that any such stimulus produces a local response; and they're Atomic in that they have no internal structure or 'subroutines'. More significantly for later developments, what internal structure may develop is unanalysed, perhaps inaccessible pending evidence of a separate Agent of analysis.

Coordination between Reflexes develops through a kind of early learning which appears to be associative rather than hypothetical. In other words, Localities which tend to be stimulated contemporaneously will tend to link together and act as stimuli for each other (see the neurological literature for detailed exposition, e.g.s Kandel et al. 1981, Lynch et al. 1984, readings in Scientific American 241/3 1979).

This model has two important advantages over the Fodorean model of learning as hypothesis testing (see arguments in Piatelli-Palmarini 1980). The first is that there is no requirement for a prior 'Language of Thought' in which to express/communicate these conjectures and refutations. Second, but equally important, is that there is no requirement for an intentional force, which would construct hypotheses, design tests and analyse results. Association - certainly at this stage - is an automatic biological process.

For a concrete example, the association between Suck, Swallow and Ingestion Reflexes is not one that is present immediately after birth, and is grasped sometimes only after help in the course of the first day (Piaget 1956). Ingestion is stimulated iff Suck and Swallow are stimulated in a particular manner and practical experience, especially successful practical experience, impresses this objective association into the child's mind. In this way associative learning is an internalisation of an objective external phenomenon.

Other such units, which we'll call Schemata, develop in a similar manner. The dominant trend in the first 2 - 3 months being the expansion of Localities and the association of innate Reflexes.

As the infant's experience grows, so do the number and complexity of its Schemata. By the end of the third month, Schemata are developing across modes of awareness (e.g. associations

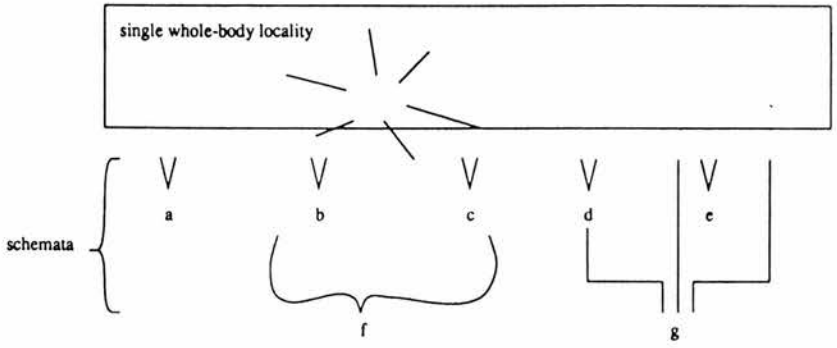

Figure 1: Subjective SpaceTime - the 'intranet'.

between vision and prehension),and over non-contiguous locations (e.g. senses of balance and proprioception may associate parts of the body which are not adjacent).

The Schema at this stage retains much of the character of the Reflex, being Independent and Automatic in its action. Structure inside a Schema is still implicit in the sense of being unanalysed: what structure there is being a subjective and concrete internalisation of the child's actual experiences and behaviours. The notion of locality is weakened by the increasing number of cross- modal and non-contiguous locations.

2 Subjective SpaceTime

Soon the Localities of Schemata begin to overlap, causing the Localities themselves to associate with each other and gain a measure of differentiation from the rest of the body of the Schema. The first stages of development, during the first 3 months, seem to have this function. The motor restlessness which the infant shows acts as an exploration of the body's own internal relationships.

What is developed seems to be effectively one whole-body Locality, a Subjective Space-time or Intranet, to certain parts of which an individual Schema is sensitive (see figure 1).

The most observable consequence of this shift is the sudden increase in body confidence in the 3 month old infant, when the child's attention moves away from the Caregiver alone toward other objects (Trevarthen 1987: 188).

Thus freed from incorporating the sensory and motor systems, a Schema now becomes a concrete internalisation of the child's situated activity. Each Schema is a connection of internal and external events which are part of some functionally identifiable situation. For example the Suck/Swallow/Ingest association may have developed into a Feed Schema internalising phenomenal imprints of foods, teats, spoons, caregivers, its own actions in response or anticipation (suck, mash, burp, gasp, ...), and so on. As this internalisation is concrete and subjective, many of the internalised entities may be accidental to the actual activity of feeding.

So the Schema does not approach a 'definition', in the sense of necessary and sufficient

conditions, of a situation: rather it is a complex of associated phenomena.

A second consequence of this separation of Locality is that Schemata are now potentially in conflict with each other. The Schemata now inhabit a single Space-time, compared with the uncohered Localities of innate Reflexes. This means that external events may provide stimuli for more than one Schema.

This conflict may be resolved automatically (i.e. focus of attention without recourse to intentional devices) by activating only those schema(ta) which receive the most stimulation. Nonetheless, the integrity of the Subjective Schema is henceforth fragile.

Vocal behaviour during this period is peripheral. During the first 3 months especially vocal behaviour has its roots in innate, Reflexive, vegetative noises - cry, coo, cough, gasp, burp, etc - noises which become a part of the situated behaviours with which they are often associated.

Slightly later the ubiquity of speech in the social environment is internalised and expressed as the various forms of babble and jargon, heard right up to the beginnings of more intellectual speech after 8 months or so (Stark 1979).

There is no evidence that this vocal play is intended as communicative or referential, however often it is taken as such by the caregiver(s).

3 Precipitation

Although the Subjective Space-time which has developed is strongly coherent, the schemata within it are transient and are almost immediately being eroded from two directions.

Firstly: each time a situation is played, it will be appreciated slightly differently — adding information and making the internalisation yet more concrete. This enrichment of the schema's internal structure will tend to create foci of association which will mirror certain objective qualities of the child's experience.

For example, the figure of a toy played with in give/take games will begin to attain a measure of identity within the schema. Properties of the toy will tend to associate more strongly with other of its own properties than with other properties of the play situation.

Second: Schemata in conflict for attention will associate if this conflict is regular. Specifically, the foci of association within each schema which are in conflict will tend to associate into a complex of associated components (see Vygotsky 1986 for more on the complex). It should be noted that these Complexes do not necessarily bear any relation to innate Reflexes, many of which decompose at an early stage.

For example figures of a toy in different schemata may 'remind' the infant of one another, as toy events may stimulate several schemata. In the same way figures of Caregiver(s) begin to cohere.

The first wave of concretion allows the second, and by around 9 months of age associations between components are stronger than those internally cohering a schema. This period up to year end is noted as one of special anxiety in the developmental psychology literature (see citations in Trevarthen 1987: 193).

4 Complexes

These complexes of associated components, which precipitate out from the Intranet, dominate the child's cognitive behaviour for the next period, including the acquisition of lexical items and early grammar.

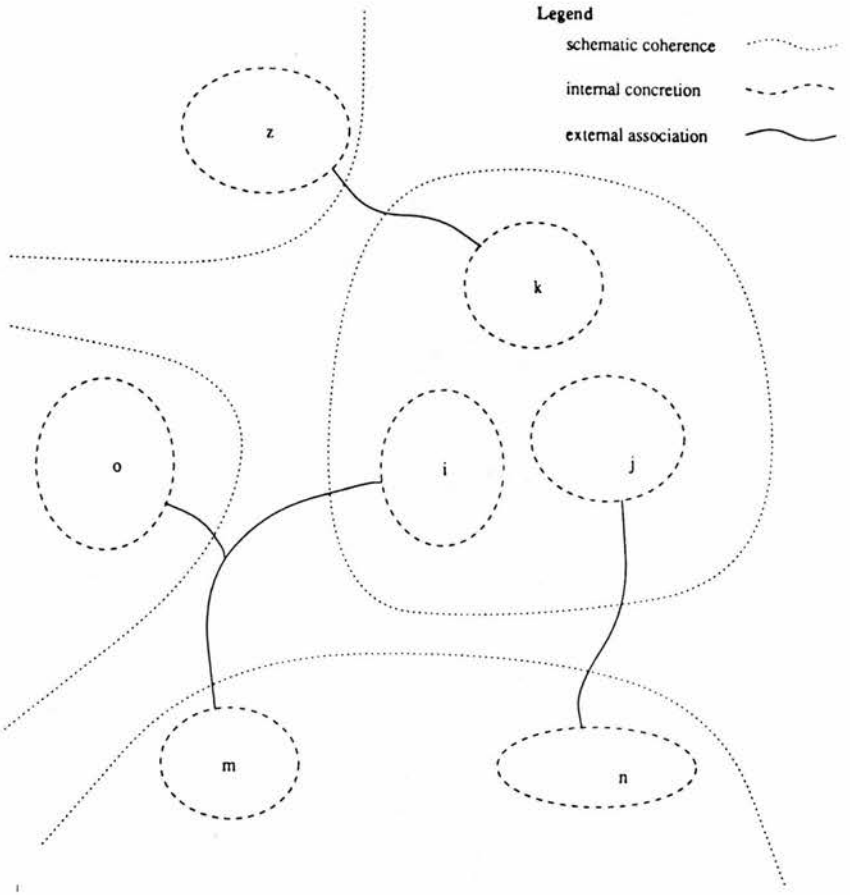

Figure 2: decomposition of Schemata

Unlike the Schema, the Complex is independent of situation and in this sense approaches the conventional concepts of adult language. However, it must be stressed that Complexes are pre-linguistic and are thus guided by the social environment to a much lesser degree. The content of the Complex is subjectively and concretely assembled, and this has significant consequences for its domain of extension.

Complexes will tend to internalise the most salient components of the child's experience. These components will be those most encountered in many situations; they will often be the most 'objective' or external to the child (i.e. easy to investigate); possibly the most 'socialised' (i.e. labelled as interesting by the caregiver(s)).

For an example in speech: 'prepositions' (or utterances based on their imitation) are acquired significantly earlier than 'verbs' (likewise) in the first months of linguistic development (see Uemlianin 1992, Tomasello 1992). For instance, in one sample of holophrastic English (Bloom 1973, MacWhinney 1991; Allison Bloom at 16 months) the words "down" and "up" amount to almost a quarter of the child's speech, whereas 'verbs' rarely occur at all.

Prepositions in this case represent a more external perception of the world, incorporating only a spatial motion or relation. Verbs tend to incorporate also an attitude or intention on the part of an Agent or Self. Unlike verbal relations, prepositional relations do not presuppose a Self.

Complexes are concrete agglomerations of experiences, as with Schemata. In the pre- and early linguistic period there is little in the way of formally received or abstract knowledge and so the child had only its own history to guide future extension of the Complex. Also, as there is no abstraction - no differentiation between accidental features of a Complex and definitive ones - the continuing concretion can induce a kind of extensional drift, a historical instability.

As the two examples in Fig. 3 show (speech from a child around year end, both from Werner 1926, cited in Vygotsky 1986: 126-7), extensional drift is almost indefinite. Each figure is a list, in chronological order, of the referents of a particular word ("quah", and "bow-wow" respectively) used by a particular child. As we see, entirely accidental features of a situation have the same definitional impact as what we, as adults, feel 'ought' to be central.

5 The social environment and the Self

This feeling of 'ought' and the impulse to correct it engenders is important (Chapman et al. 1983). It appears that stability of meaning, and the abstraction that enables it, are entirely contingent on pressures and attractions within the social environment.

Although the child's social environment has been absent so far from this paper, it is not absent from the child's experience. Indeed, it may be that a Social Environment may be internalised before a coherent physical environment (i.e. before the development of Subjective Space-time). From the first weeks, presence of the primary caregiver(s) acts as a general sensitizing stimulus - having been associated with almost all of the infant's stimulating situations (feeding, care, play), the presence becomes stimulating in itself (see citations in Trevarthen 1987: 184).

The Social Environment develops a commentary function upon the physical environment. Play for example encapsulates and underlines certain properties of the world in safe and easy to understand segments: give/take demonstrating distance and encouraging independent movement; hide/seek demonstrating object permanence. Thus, phenomena which are drawn into a social commentary, which are socialised, tend to be more salient and more concretely

(a) **QUAH**

a **duck** swimming in a *pond;*
any *liquid;*
the *milk* in his bottle;
a coin with an **eagle** on it;
any round coinlike object;
...

(b) **BOW-WOW**

day	
251	a china *figurine* of a girl;
307	a **dog** barking in the yard;
	the *pictures* of his grandparents;
	a *toy* dog;
	a clock;
331	a **fur** piece with an animal's head (glass *eyes*);
	a **fur** stole without a head;
334	a rubber *doll* that squeaks when pressed;
396	his father's *cufflinks;*
433	pearl *buttons* on a dress;
	a bath thermometer;
	...

Figure 3: Complexes in speech (Werner 1926: cited in Vygotsky 1986)

appreciated by the child.

6 Conclusion

The child's early language tends to be situation- and object- oriented. As the Environment precipitates it decomposes into things and people- as-objects (e.g. nouns), relations (prepositions) and activities (transitive verbs). It seems the item least amenable to social commentary is the child's own self, as even reference to self-as-object is a fairly late development. For example, such utterances as "Allison go now," "Baby want apple" don't appear with any regularity till around the end of the second year (Uemlianin 1992, Radford 1990 and citations therein). The marked Self or Subject (I, me, mine, my, etc) only begins to develop during the third year (O' Grady et al. 1989).

Subject acquisition is a part of the acquisition of a bundle of syntactic practices which often come under the heading Functional Categories - use of determiners, cases, tense, 'Wh-' words, auxiliary verbs, and so on. This is true also of pro-drop languages like Italian (Valian 1991), where properties of the Subject are signalled by the settings of various Functional items.

This linguistic development in turn is a part of the final gradual collapse of the child's Subjective Space-time. Although objects, relations and activities become dissociated from the end of the first year, the Space-time, or the context, in which these events take place remains Subjective. The perspective of the child is the only perspective: for example objects' relations in space may be internalised as their relations in the child's visual field. Piaget (1955: 364f) terms this Egocentricity.

The psychological shift around the end of the second year is a decomposition of this perspective, accompanied by an expanding social environment . An early step is often to invest every object or event with the same Agency as its own actions (Piaget 1955: 378).

The new challenge to communicate with people other than caregivers encourages the child to dissociate events from their locations in space- time and to lexicalise these locations. An early example of this occurs towards the end of the second year when, for practically the first time, objects other than the child itself can be referred to as Agents of events, e.g. "Mommy pour juice" in the Bloom (1973) study.

The creation of a Self, then, appears to be a demotion. The child's own perspectives lose its privelege, to become one of many. Perhaps it's not the Self but the not-Self the child discovers.

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